Review of Models, Simulations, and Games for Domestic Preparedness Training and Exercising

Volume I

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1. BACKGROUND

The mission of the Office for Domestic Preparedness (ODP), Department of Homeland Security, is to develop and implement a national program to enhance the capacity of state and local governments, as well as first responders, to prevent and respond to terrorism events involving Weapons of Mass Destruction (WMD). Since 1998, ODP has developed and administered a training and exercise program to enhance the ability of U.S. cities to respond to terrorist incidents involving the use of chemical, biological, or radiological agents.

Recent events have broadened the scope of ODP's mission: demand for domestic preparedness (DP) training has increased dramatically since 9/11 and has likely been exacerbated by war in Iraq. In addition, ODP's mission has been evolving as a result of the move from the Department of Justice to the Department of Homeland Security in early 2003 and the subsequent realignment of priorities.

To date, ODP has presided over an exercise program that delivers exercises face-to-face (F2F) using contractor teams. These exercises are costly and require a fairly long lead-time to set up. ODP-sponsored training is predominantly F2F classroom or live event training, with some distance learning. Given the heavy reliance on F2F delivery, the maximum amount of training and exercise (T&E) that can realistically be delivered is much lower than the demand for such T&E.

ODP would like to offer local communities a broader array of T&E options, covering a much wider choice of costs, staffing levels, and resources. ODP contracted with ThoughtLink, Inc. to review existing models, simulations, and games (MS&G) to see whether current off-the-shelf products could be used in the ODP T&E program. These products range from low-cost single user computer games, to distributed collaborative environments for senior decision-makers, to complex programs simulating the movement and allocation of thousands of resources.

This considerable task includes: identifying ODP T&E requirements, reviewing related T&E initiatives, conducting three rounds of product evaluations, and identifying a strategy for selecting and using products.

The challenges to ODP, and thus to ThoughtLink, in developing a more robust DP T&E program include:

- The inclusion of both training and exercising, which often have different goals and different means to accomplish those goals.
- The training audience is broad, covering about ten functional areas, from Fire to Public Works to Public Information.
- A wide range of T&E proficiency levels must be supported, from basic to advanced, from initial acquisition to refresher training or exercising.
- An exceptionally wide geographic area is included: the entire country plus U.S. territories, covering small towns as well as large urban cities.
- The focus is on existing products vs. products custom-designed to fit ODP needs.
- T&E must address multiple WMD threats, and these can have different T&E requirements.
- DP T&E requirements are continually evolving as is evidenced by ODP's current work on defining terrorism prevention tasks and associated T&E requirements for those tasks.

To aid in addressing these challenges, ThoughtLink can leverage recent work in the DP area, including Pelfrey, Kelly, and May, 2001; ODP Emergency Responder Guidelines, 2002; Homeland Security Exercise Evaluation Program (HSEEP) Vol. I, 2003; and Federal Emergency Management Agency (FEMA) Assessment of Federal Terrorism Preparedness Training for State and Local Audiences, 2002. In addition, there is increasing use of MS&G across government agencies, some of which involves dual-use products with both commercial and government applications. MS&G developed for other government agencies and commercial applications may be applicable to ODP needs.

The initial phase of the ThoughtLink project focused on an evaluation of ODP's T&E program and identified the associated T&E requirements; that work is documented in Agrait, Evans, Grossman, Hammell, Loughran, and Stahl, 2003.

2. DOCUMENT PURPOSE

ThoughtLink was tasked to evaluate MS&G products for use in ODP's training and exercise program. The end-state will be a series of product evaluations and a strategy document outlining how those products could augment or support the training and exercise program, as well as the benefits and disadvantages of each product. Currently available commercial-off-the-shelf (COTS) and government-off-the-shelf (GOTS) products will be evaluated; however, where necessary, ThoughtLink will identify the not-on-the-shelf (NOTS) products needed to fulfill ODP's requirements.

This document, the first of three reports covering product evaluations, describes the product evaluation methodology and its underlying rationale, describes the 17 products reviewed in this first round of evaluations, and analyzes the relationship between the 17 products' characteristics and ODP T&E needs. It also analyzes other product characteristics, since there are many factors beyond T&E requirements that ODP will want to consider, such as staff requirements, time and cost to adapt to ODP needs, After Action Review (AAR) capabilities, etc.

This document does not compare products against each other. The final report of this project, in April 2004, will present the larger picture, showing the universe of products evaluated relative to ODP T&E needs, and indicate which ODP needs are covered and which are not. That final report will identify useful product categories and present information to help ODP select specific products from those categories; however, ThoughtLink will not recommend specific products. The final report will also include recommendations for the overall ODP T&E program, beyond MS&G considerations.

3. METHODOLOGY

In considering the product evaluation task, it was critical to develop a flexible framework that could change and expand over time, since T&E requirements will evolve (e.g., prevention tasks are currently under consideration to be added to the ODP mission). In addition, the approach must accommodate a wide variety of products, and support evaluation at the appropriate level of detail that enables analysis, without becoming overwhelmed by requirement details and disparate features of products.

ThoughtLink started with the well-established Instructional Systems Development (ISD) process, extensively used by the U.S. military and civilian agencies, and adapted it for the unique features of this task (notably that the process considers existing MS&G, or media as they are also referred to, vs. custom-designed solutions to T&E needs).

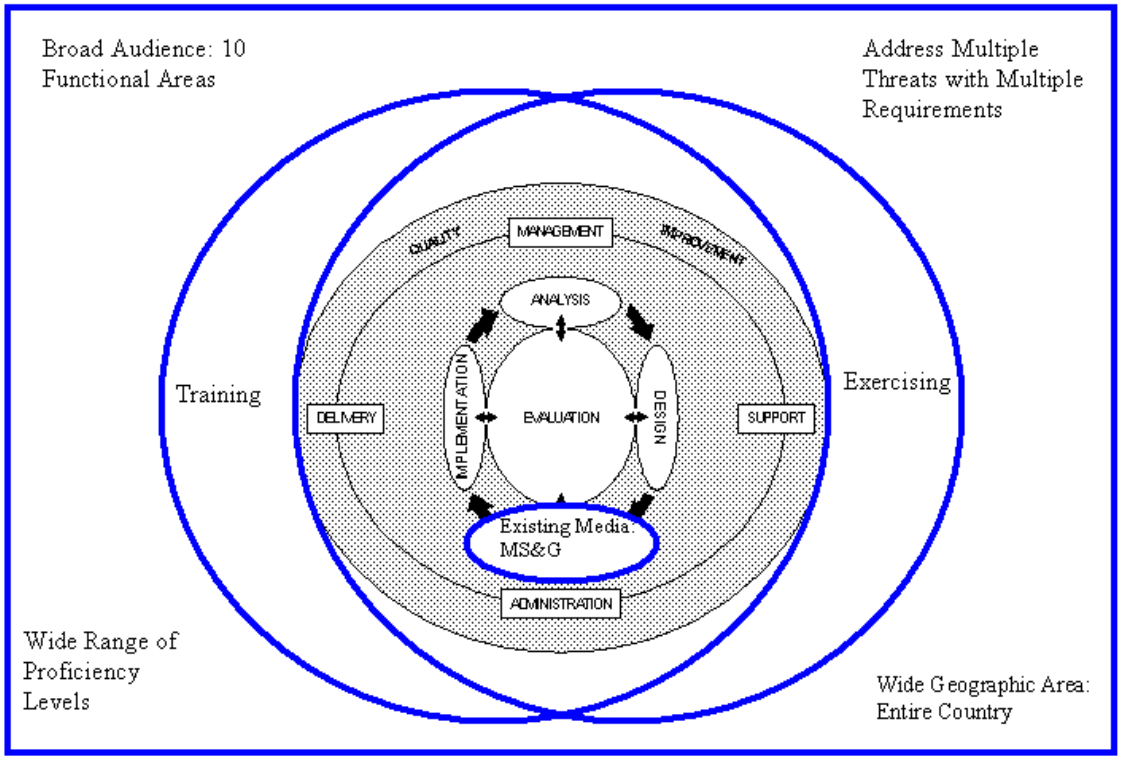

Figure ES-1. Tailored ISD Process

A key tool used in the process is Rational RequisitePro (RRP), a requirements management tool designed to support the definition, tracking, and analysis of requirements. This product allows ThoughtLink to derive requirements from various sources and track that derivation; associate custom-defined attributes with requirements; and link requirement attributes to product attributes.

The primary steps in the methodology were to:

1. **Develop high-level requirements and strategy categories for T&E** – ThoughtLink collected and defined a superset of nearly 800 T&E requirements, identified from Agrait et al., 2003 and authoritative sources such as the Training Strategy for ODP with Implications for WMD Training (Pelfrey, Kelley, and May, 2001), ODP contractor information, and FEMA work. These hundreds of requirements were then grouped into similar categories. Next, some T&E strategy elements (such as the need for individual training or team training) were added to the categories, yielding a list of 20 categories. Sample requirements categories include: Individual Basic Knowledge tasks, Individual Hands-on Equipment T&E, and Team Advanced Knowledge Applied T&E. All categories, all requirements, and the mapping of requirements to categories are captured in the RRP database.

2. **Review products** – We identified key attributes to consider in the product evaluations and created a template to use in the evaluation. ODP approved a list of 17 products for the initial product evaluation. Each ThoughtLink team member evaluated several products, creating narrative descriptions of products. (One-page descriptions of each product can be found in Section F.) Next, to facilitate analysis, we created Excel spreadsheets of numeric data, where rows are products, columns are attributes, and cells contain ratings of the extent to which a particular product, in its current form, fulfills that attribute.
3. **Analyze products** – This proceeded on several fronts. One key part of the analysis is to identify the relationship between product attributes and T&E needs. We have developed a set of attributes that distinguish the 20 T&E categories and we coded each product for these attributes. That allows us to generate a matrix comparing T&E needs to existing product capabilities. However, this does not completely characterize the possible utility of a product. Thus, additional analyses look at other useful product attributes such as: whether the product has automated feedback and/or makes recommendations for improvement or sustainment to users; subjective assessments of face validity and ease of use; whether the product tracks communications or information-sharing among players; etc.

4. FINDINGS AND RESULTS

The goals for this part of the project were to develop a suitable framework that will be used for all three rounds of product evaluations and to present results from the first round of evaluations, characterizing MS&G along certain dimensions. This report documents the framework, the evaluation process, and preliminary results from the first set of product evaluations.

Key accomplishments include:

Consolidated T&E requirements from multiple sources – A significant part of the work supporting this task has been devoted to gathering requirements and creating categories, then putting that information into RRP. This will be a foundation for future evaluations and, although it will need to change as new requirements are identified, will not need to be repeated. This consolidated list of requirements will likely be useful to other ODP projects.

Developed a flexible methodology for the review process – ThoughtLink has created a flexible framework for subsequent evaluations that can easily be modified to

accommodate the inevitable changes as ODP's mission continues to evolve, new requirements are identified, and new products are evaluated.

Started to develop a picture of the MS&G universe of products laid over ODP T&E needs – The complete picture will be clear at the conclusion of this project in April 2004. Inevitably, some needs may be over-met (there may be many MS&G that can fill a particular T&E need), some needs may not be met at all (NOTS will be identified along with suggestions for filling them), and some needs will fall in the middle.

Although findings from the product evaluations are preliminary, a few results are worth noting at this time; they may influence future product selection and analyses.

Awareness Training – Few products surveyed (24 percent) were deemed appropriate for WMD awareness training. Though at this time this may be a function of product selection and analysis; additionally observations of ODP's T&E program also indicate a lack of awareness training and a lack of documentation of awareness-level requirements.

Advanced Level Requirements – The most commonly targeted user type for the current round of evaluations is command-level personnel. The requirement extraction process yielded a substantially greater number of advanced level requirements (73 percent) than basic (27 percent). At this stage in the analysis, this would suggest MS&G media are available and appropriate (based on the product-to-requirement mapping, expanded upon in section E3); however, ThoughtLink observations and analysis point to a lack of basic level requirement specifications.

New Concepts for Improving Training and Exercising – ThoughtLink's mission to augment the current T&E program has yielded identification of new T&E areas potentially supported by MS&Gs (e.g., part-task training, improved exercise communications[1]). Though it is relatively straightforward to identify MS&G that provide those capabilities, the value also comes from including the link between products and requirements, as illustrated in this report.

5. NEXT STEPS

Two subsequent rounds of evaluations will follow this report, at six-month intervals. Reports are scheduled to be completed in October 2003 and April 2004. The

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[1] See Agrait et al., 2003 for a complete listing and discussion.

culmination of the project will be a strategy covering product evaluations, selection of products and T&E strategy, recommendations for ODP's T&E programs, and a roadmap for the way ahead.

The final report will include a discussion of ODP's overall T&E system. T&E needs are not completely met by media. Media are one piece of a larger system that encompasses an adaptable program strategy capable of anticipating and meeting needs via continuous people and technology inputs. According to David McIntyre in "Education for Homeland Security – The Critical Need,"[2] "To secure our homeland..., a rigorous, sequential, and progressive program of professional education in homeland security is essential. This program must be created, virtually from scratch, and it must consist of at least three parts: a new curriculum, a new, structured program, and new means of delivery."

The final report will contain recommendations addressing major aspects of the ODP T&E system, including the following:

- **Training and exercise requirements** – A consolidated list of all T&E requirements identified during the two years of this project will be included, grouped into categories. These will provide reinforcement, where appropriate, to current training and exercising initiatives, and provide guidance for future developments.
- **Training and exercise MS&G products** – Categories of MS&G to support and enhance the ODP T&E system will be recommended and factors to consider when selecting specific MS&G products will be presented.
- **Training and exercise strategies** – Specific strategies based on the instructional strategy elements identified and reviewed with regard to the requirement categories and media will be discussed.
- **The overall ODP training and exercising program** – This will include recommendations for incorporating technology-based training products into existing training and exercise offerings, and recommendations for enhancements to the program.

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2 Original article in ETS News, Winter 2002-2003, GDR Ltd., UK; "reprinted" in http://www.homelandsecurity.org/HLSCommentary/Education_for_Homeland_Security.htm accessed on 12/19/02.

A. OVERVIEW

1. PROJECT BACKGROUND

The Department of Homeland Security's Office for Domestic Preparedness (ODP), formerly under the Department of Justice, is responsible for providing assistance to the states, territories, and the District of Columbia in training and exercising for prevention of, and response to, the use of Weapons of Mass Destruction (WMD). ODP's training and exercise program must support the full range of emergency responders, from first responders (fire, medical services, police, etc.) to state, local, and federal officials and emergency management agencies. Since 1998, ODP has offered training to emergency responders at all levels and assistance in designing and conducting exercises that address homeland security preparedness for WMD.

The attacks on the US on September 11, 2001 underscore ODP's increasingly urgent mission of counter-terrorism training. ODP's current approach to training and exercising is resource intensive in terms of time to design and prepare an exercise and the amount of manpower required for execution. This approach may not be able to adequately address the expanding demand for domestic preparedness (DP) training and exercise (T&E). ODP realized that information technologies, in the form of models, simulations, and games (MS&G), could help extend the reach of the program and provide the States additional tools for protecting against WMD. ODP wanted an assessment of which MS&G products matched the specialized requirements for training and exercising for prevention and response to WMD events. ThoughtLink, Inc.[1] was hired to conduct a requirements analysis and product evaluation, and develop a road map to present the future vision for ODP training and exercising.

The following table identifies ThoughtLink's specific tasks on this project, the deliverables associated with each task, and the current task status.

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[1] ThoughtLink is a small consulting firm with experience in simulations, collaboration technologies, and assessing the effectiveness of games for training applications.

Table 1. ThoughtLink Tasks, Status, and Associated Deliverables

Status	Task & Deliverables
	Review archived exercises and the current ODP exercise program
	• Mar 03 – *ODP Exercise Program Review: Opportunities for Models, Simulations, and Games*
	Analyze the training and exercise requirements for all levels of domestic preparedness spectrum of command from first responders to senior managers at the local, state, Federal, and international levels
	• Mar 03 – *ODP Exercise Program Review: Opportunities for Models, Simulations, and Games* • May 03 – *Review of Models, Simulations, and Games for Domestic Preparedness Training and Exercise - Vol. I* • This task will continually evolve and results may be documented in future reports
	Evaluate GOTS and COTS games and simulation products and critique candidate products for ODP use
	• May 03 – *Review of Models, Simulations, and Games for Domestic Preparedness Training and Exercise - Vol. I* • Report planned for Oct 03 – *Review of Models, Simulations, and Games for Domestic Preparedness Training and Exercise - Vol. II* • Report planned for Mar 04 – *Review of Models, Simulations, and Games for Domestic Preparedness Training and Exercise - Vol. III*
	Conduct surveys of current and near-term related training and exercise initiatives in related domains
	• Report planned for Jan 04
	Analyze the effect of the recommended games and simulations on ODP exercise training strategy and identify how the ODP exercise program would be affected, including the development of a gaming and simulation roadmap for the way ahead
	• Report planned for April 04

Symbol	Key
	Concluded
	Ongoing

To date, ThoughtLink has reviewed the current ODP exercise program as well as selected prior exercises conducted from 1997-2000 under the Nunn-Lugar-Domenici exercise program. One major focus of the review was a series of 105 interviews conducted with exercise planners and participants, as well as ODP staff, contractor teams, and various local, state, and Federal officials. The exercise review helped us identify exercise program requirements and objectives. Results are documented in Agrait, Evans, Grossman, Hammell, Loughran, and Stahl, 2003.

Other sources providing training and exercise requirements include Pelfrey, Kelly, and May, 2001; ODP Emergency Responder Guidelines, 2002; Homeland Security Exercise Evaluation Program (HSEEP) Vol. I, 2003; Federal Emergency Management Agency (FEMA) Assessment of Federal Terrorism Preparedness Training for State and Local Audiences, 2002; and sample Titan Systems exercise objectives.

This report is the first of three to address the third task in Table 1: evaluate government-off-the-shelf (GOTS) and commercial-off-the-shelf (COTS) games and simulation products and critique candidate products for ODP use. The product evaluation was partitioned into three rounds, to increase the timeliness of the information provided to ODP. This report covers the first round of product evaluations. Two subsequent reports will follow at six-month intervals, covering additional MS&G.

This report begins with a presentation of the methodology supporting this and future product evaluations. The methodology section describes how a relatively small set of T&E categories was derived from nearly 800 T&E requirements and how T&E strategy elements were added to the categories. It then describes each of the 17 MS&G reviewed in this round of the evaluations, the attributes by which products were evaluated, and how the products map to ODP training and exercise requirements. Product characteristics are described, such as: intended T&E audience, functional areas supported (e.g., law enforcement or medical), type of WMD events supported, type of feedback, etc.

Note that this document does not rank MS&G individual products against each other. Ultimately, the results from this project, to be documented in the final deliverable, will describe categories of MS&G products (e.g., virtual simulations for large multi-functional teams) that can assist ODP's T&E programs and discuss attributes to consider when choosing a specific product within a given category.

The final deliverable for this task, scheduled for April 2004, will be a road map outlining how MS&G can support the increased demand for WMD preparedness training

and exercises; suggestions for how and when to use MS&G; and recommendations for effective T&E strategies. This report will consider all the MS&G evaluated over the course of this project and identify the types of MS&G that best fit a variety of needs, from augmenting the current ODP exercise program to filling unmet T&E needs. Key factors to consider when choosing among specific products within a particular MS&G category will also be discussed.

In addition, the ThoughtLink team will investigate training and exercise initiatives in related domains, from government agencies and commercial industries.

The overall approach to this project can perhaps best be described as a spiral process. The ThoughtLink team is constantly learning and refining their ideas about this challenging area. As ThoughtLink continues to collect information about ODP's training and exercise requirements, other training programs, and aspects of specific MS&G products, this knowledge, together with prior information and observations, will be reintroduced and expanded upon throughout the project's lifecycle. This iterative approach also provides an opportunity for ODP to provide their feedback and ideas that might be generated from ThoughtLink's interim deliverables.

2. STRUCTURE OF THIS DOCUMENT

The work described in this report includes: developing an evaluation methodology; identifying 17 MS&G; applying that methodology to these products; and analyzing the results.

The remainder of this report is organized into six sections.

Section B – Requirements and Product Evaluation Methodology

This section describes the structured process used to evaluate the MS&G under consideration. The methodology is an adapted version of the Instructional Systems Development (ISD) process, discussed in this section.

Section C – Requirements Extraction and Categorization

This section describes how requirements and strategy elements were grouped into T&E categories, which was the first phase in implementing the methodology.

Section D – Rational RequisitePro

Rational RequisitePro (RRP) is a requirements management tool used on this project to manage requirements, documents, and product ratings. This section provides an overview of RRP functionality and examples of its use supporting the requirements categorization and product ratings.

Section E – Review of Training and Exercise Products

This describes how MS&G were evaluated, illustrates the kinds of analyses developed from the MS&G evaluations, and links products to T&E categories. Groupings of products along various dimensions such as media type, functional area supported, etc., are described. The linkage between product capabilities and ODP's T&E requirements is illustrated and discussed.

Section F – Product Summaries

Brief one-page descriptions of each of the 17 products are found here.

Section G –– Summary

This section recaps the work completed in this phase of the project: the evaluation methodology and results of its application. The next steps on the project are described.

B. REQUIREMENTS AND PRODUCT EVALUATION METHODOLOGY

This section addresses the methodology used to categorize T&E requirements and evaluate MS&G products.[2] This includes the development of a database identifying responder and decision-maker activities that may be achieved by training and/or exercising, and relating them to recommended instructional strategy attributes for effective achievement. This section also outlines the methodology used to review the initial set of MS&G products, with regard to a common set of attributes.

The project needed a systematic process for identifying training and exercise requirements relevant to ODP and mapping these requirements to potential MS&G products. The process selected is a variant of the ISD process. This section describes the ISD process and how the process was adapted to support this project for ODP.

1. INSTRUCTIONAL SYSTEMS DEVELOPMENT PROCESS

The analysis and design of complex training systems over the past several decades, particularly in the U.S. military, has followed a process generally known as the Systems Approach to Training (SAT).[3] The more recent extensive military adaptation and refinement of this methodology is the ISD process, which has been pragmatically applied by many government and private organizations. The U.S. Air Force, for example, has developed a series of handbooks guiding application of the ISD process to the design and operation of training systems (e.g., U.S. Air Force, 1993). The ISD process, and its earlier SAT counterparts, are essentially an adaptation of systems engineering methodology, in which a training device is viewed as a component of the training system. Other components include the students, instructors, courses, instructional methods, and training system management. The ISD process has been successfully applied to the design of many technology-based training systems.

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2 The terms MS&Gs, media, products, and tools are used interchangeably to mean those artifacts being evaluated to possibly enhance ODP's Training and Exercise (T&E) program.

3 Chenzoff and Folley, 1965; Gagné, 1966; Gagné and Briggs, 1974.

The ISD process provides a systematic framework for performing analysis, design, development and implementation of a total instructional system. As such, it is a flexible process that is often tailored to the particular needs of each program. The ISD process is depicted in Figure 1, showing a closed cycle progression of continual quality improvement for the instructional system.[4] The basic top-level system functions are:

- **Management** – Oversight of instructional system development and operation
- **Support** – Maintaining the system
- **Administration** – Providing administration support to the daily operation
- **Delivery** – Providing instruction to the students.

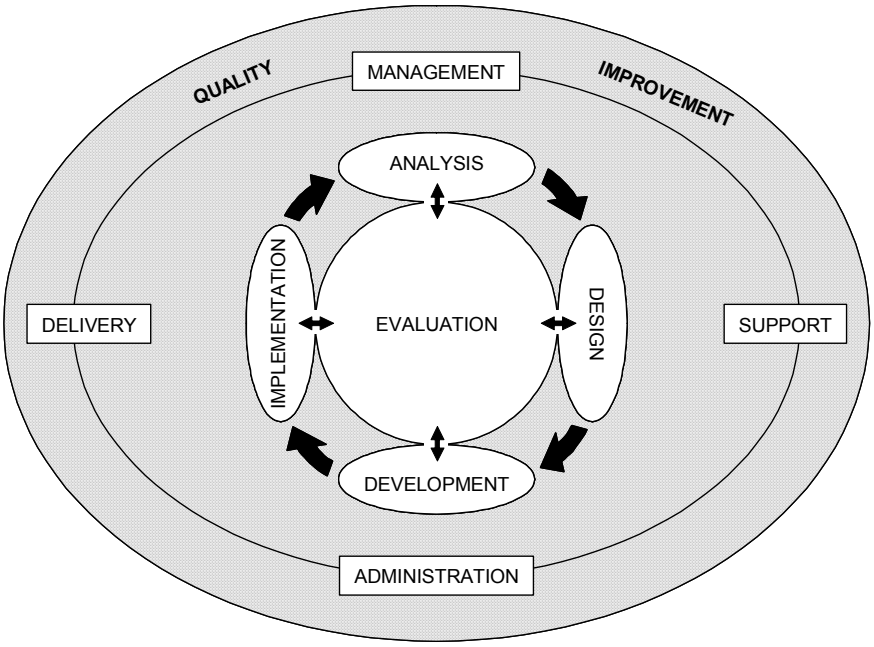

Figure 1. Air Force ISD Model[5]

The four development phases of the ISD process are embedded in the system functions:

- **Phase 1, Analysis** – System needs are determined, such as the tasks to be performed, and identification of training needs. A learning/training analysis would, typically, analyze existing training programs, identify skills and knowledge needed to perform requisite tasks, the skills and knowledge

4 U.S. Air Force, 1993.

5 U.S. Air Force, 1993.

learners have when entering training, and identification of learning requirements (i.e., identification of needed training). Finally, this analysis would typically identify resources available for development of the training system, and conduct of sustained training.

- **Phase 2, Design** – The specific training system elements are determined and designed. The terminal training objectives to be achieved by students trained in the system would be specified, to guide design decisions for other training system elements. Other system elements designed may include the training program (series of courses), selection of media and design/specification of their characteristics, and design of the instructional strategy.
- **Phase 3, Development** – The training system elements specified in Phase 2 would be fully developed. This would typically include detailed development of the course(s) (e.g., learning events and activities, instructor and student guides, materials) embodying the instructional strategies, training media (e.g., training device(s), including simulation), and management and logistics processes and procedures.
- **Phase 4, Implementation** – The training system, including all elements, would be prepared for training; training conduct would begin. Instruction would be conducted in accordance with the management plan, using the various elements of the system.
- **Evaluation** – An additional vital part of the ISD process, and sometimes referred to as a fifth phase, is evaluation, feedback, and system modification. Evaluation is considered as an essential component during each phase of the ISD process. It is also called for after training commences, to assess the effectiveness of training in accordance with the design goals, to assess how graduates perform on the job, and to revise the training system to improve its effectiveness (i.e., providing a return loop to Phase 1, to continue to the process and improve the system). This should be an on-going process in every training system. Evaluation, as centrally depicted in Figure 1, is considered key to the ISD process.

The ISD methodology is an iterative process, as evidenced by the continual evaluation activity and return loop to Phase 1 after implementation of the training system. Iteration often occurs within the first two phases, and particularly in the design phase, as information is generated and alternative training approaches and designs are investigated.

The ISD process is often adapted to meet the needs of the project, such as using a combination of available and newly-generated information, focusing on selected parts of the process to achieve particular goals, and adapting processes to meet resource and time requirements.

2. TAILORED ISD PROCESS

A tailored ISD process was devised to meet the particular needs of this project. This structured methodology uses parts of the ISD process, as appropriate for project objectives and resource and schedule requirements. The methodology is described in the following subsections.

Unique Training and Exercising Challenge. The ThoughtLink team and ODP face a unique T&E system analysis and design challenge: addressing the training and exercising needs of millions of responders and decision-makers across the country. This mission is compounded by additional factors that add important dimensions to be considered by the ISD process, significantly complicating the analysis and design process (the combination of these dimensions is somewhat unique to the ODP T&E problem). These complicating factors include:

- MS&G products must address both training and exercising needs. Although these needs certainly overlap, they also have distinct requirements.
- The potential T&E audience spans a number of different job categories, each with unique task requirements and T&E needs, including:
  - Emergency Management Agency
  - Emergency Medical Services
  - Firefighters
  - Governmental Administration
  - HazMat Personnel
  - Health Care
  - Law Enforcement
  - Public Safety Communications
  - Public Works
  - Public Health.

In addition, there are global tasks that span all job categories.

- A range of T&E proficiency levels must be supported within each job category, from basic to advanced levels. The approach employed must address initial, improvement, and refresher/recurrent T&E needs. And, the system must simultaneously address a range of student/participant entry skills and knowledge (also referred to as input characteristics).
- An exceptionally wide geographic area is involved: the training and exercising must be achieved for individuals, groups, and teams across the country.

Furthermore, it must address the often diverse needs of small communities, large cities, and regional areas.

- The media emphasis for ThoughtLink's effort is on existing MS&G technologies, rather than custom-designed products, to meet the ODP training system requirements. However, in the final roadmap document for this project, we anticipate identifying areas where no products exist – also referred to as the NOTS (not-on-the-shelf).
- The T&E must address the different WMD threats, each of which may have substantively different T&E requirements.

Figure 2 illustrates the adapted process reflecting the above-mentioned challenges.

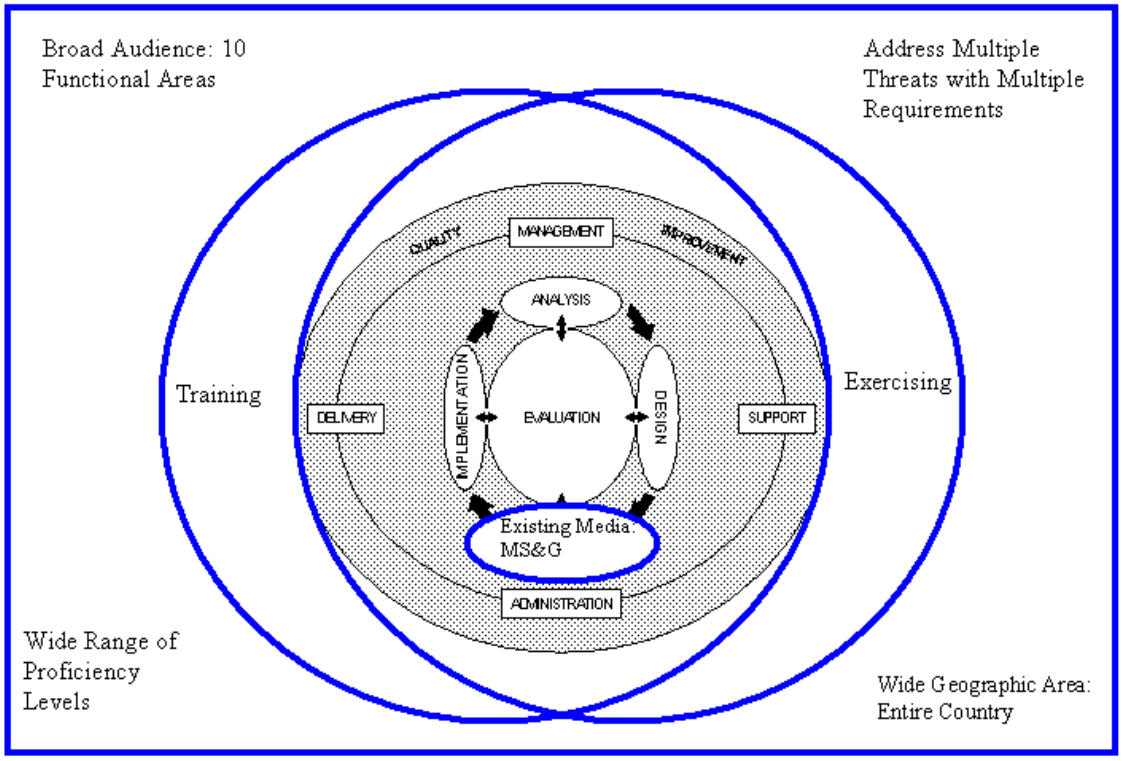

Figure 2. Tailored ISD Process

The challenge is to perform an analysis that considers these factors, within a reasonable time frame, and which will yield meaningful results to guide the use of MS&G in ODP's training and exercising process. Implementing the methodology proceeds on two tracks: collecting data in great detail about individual products and requirements, while performing the analysis at a higher level. This will yield system-

wide macro-level conclusions and recommendations, while maintaining the native detail in the database for later probing analyses requiring greater resolution.

Project Focus Within ISD Process. The focus of this project is primarily on the training and exercising media (i.e., MS&G), specifically evaluating the viability of COTS and GOTS technologies to support ODP training delivery. To successfully evaluate the approved list of MS&G products, the project must focus on identified training and exercising requirements. These are necessary for understanding media requirements, and also provide direction for potential application of the application of specific MS&G products. Finally, the project focus must also closely consider the potential instructional strategies (i.e., including exercise strategies) to be employed using the media. Design of the media and instructional/exercising strategy components of the T&E system go hand-in-hand; each is dependent on the other.

The project's primary focus within the ISD process, therefore, is on the T&E requirements; T&E media (MS&G); and T&E strategies (i.e., parts of Phases 1 and 2 of the ISD process). This focus is illustrated in Figure 3, showing the media and strategies stemming from the requirements being analyzed simultaneously, and interrelated.

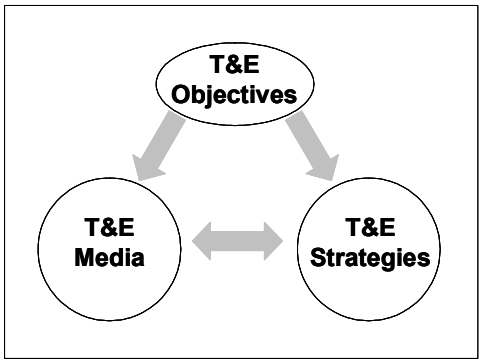

Figure 3. ODP T&E Requirements Analysis Primary Focus

3. ANALYSIS TASKS

Figure 4 provides a flow diagram of the major MS&G product analysis tasks. As can be seen in the figure, this effort began with Tasks #1 and #2 conducted in parallel. At

the current time, work is being performed on Tasks #1 through #4. These tasks, which are being continuously refined, are:

- **Compile T&E requirements** – Behavioral items[6] representing the requirements of ODP training and exercising were compiled from multiple source documents,[7] and placed into requirement categories, with the categories representing major elements of recommended T&E strategy.
- **Review media** – A group of COTS and GOTS MS&G products was compiled for potential evaluation; 17 of these were reviewed in depth during the first round of evaluations. This task will continue for the duration of the project, with additional media identified and reviewed.
- **Link strategy attributes with T&E requirement categories** – Potentially relevant training and exercising strategy attributes, in addition to those used to define the requirement categories, were identified and linked with the requirement categories. This provides refinement of the recommended T&E strategies, and also provides a basis for linking the requirement categories with the MS&G media.
- **Link media with the strategy attributes, and T&E requirement categories** – The MS&G media were similarly evaluated with regard to the T&E strategy attributes, as well as other factors potentially important to their use in ODP T&E.
- **Develop T&E system recommendations** – The T&E strategy attributes, and the results of Tasks #3 and #4, provide the common basis for linking the MS&G media with the T&E requirement categories. Analysis of these relationships (i.e., MS&G media and T&E requirements) is ongoing and will form the basis for generation of the T&E system recommendations. The final deliverable will be a proposed roadmap and T&E strategy that describes how to best incorporate MS&G into the ODP program.

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6 The collection of learning objectives, performance objectives, skills, knowledge, and other behavior-related statements indicative of responder and decision-maker training and exercising requirements.

7 See Section C for complete listing.

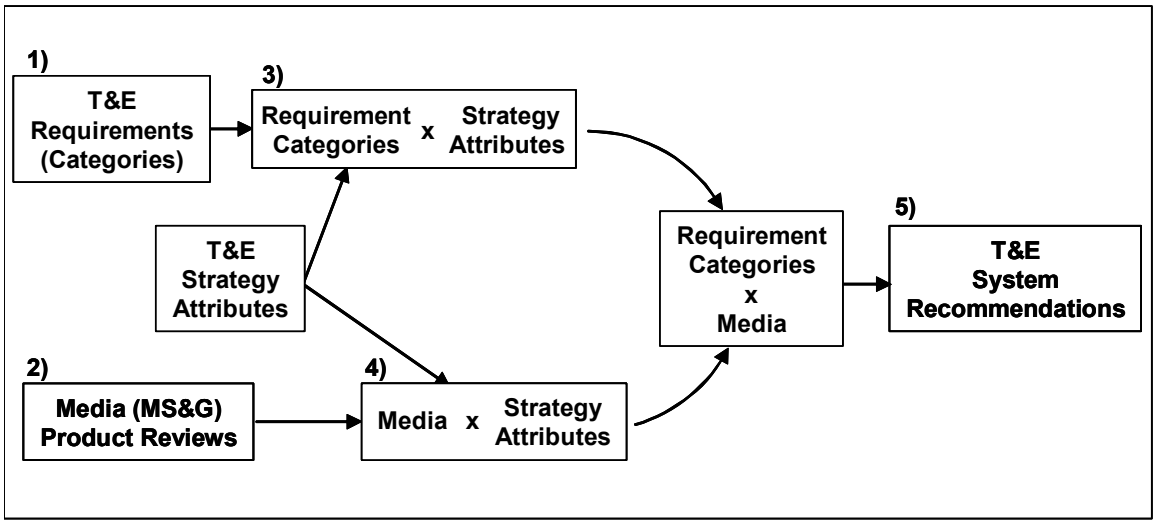

Figure 4. Analysis Tasks

The next section of this document, Section C, describes the development of requirement categories. Section D discusses the use of RRP to support the methodology and analysis. Product evaluation is covered in Sections E and F.

C. REQUIREMENTS EXTRACTION AND CATEGORIZATION

This section discusses the responder behavioral items and their transformation into the requirement categories used for evaluation of MS&G products. Responder behavioral items is a term used interchangeably with learning objectives, performance objectives, skill and knowledge, requirements, and other T&E statements indicative of responder and decision-maker job elements in this document.

An approach was devised to bundle individual behavioral items into higher-level requirement categories. Using these categories, instead of individual requirements, facilitates the evaluation of media and strategies. This grouping of requirements was necessary due to the very large number of T&E requirements; nearly 800 have been identified. In this report the categories are referred to as T&E requirement categories.

The labor-intensive process of reviewing hundreds of requirements and assigning each one to a category underwent many iterations to arrive at its current state. Because there is currently so much ongoing research into DP T&E requirements, additional responder behavioral content will be added to the requirement categories in the future, as it becomes available. It is also expected that the categories will be refined as a result of the continuing analysis (i.e., modification of existing categories, creation of new categories).

The current and future media approved by ODP for ThoughtLink's consideration will be evaluated with regard to their ability to support the T&E requirement categories, which represent the comprehensive set of responder behavioral items.

Specifically addressed in this section are:

- ODP T&E Community Activity Data Sources,
- Definition of Requirement Categories, and
- Content of Requirement Categories.

1. ODP T&E COMMUNITY ACTIVITY DATA SOURCES

A variety of documents and other data sources were reviewed to assist in identifying a comprehensive set of training objectives against which the MS&G products

could be evaluated. From this large group, a number of authoritative sources were found that provide identification of responder and decision-maker behavioral items.

Due to the unique and relevant contributions of each source, it was decided to combine the behavioral items from the multiple sources into a single comprehensive set. The responder and decision maker behavioral items for the training and exercising process, comprising the requirement categories, were compiled from selected existing sources, including the following:

- Training Strategy for ODP with Implications for WMD Training (Pelfrey, Kelly, and May, 2001) – This document provides sets of tasks and learning objectives across multiple responder job categories.
- Emergency Responder Guidelines (ODP) – This document provides an integrated compilation of responder skills, knowledge, and capabilities. It addresses these at several training levels, across five job categories.
- ODP Exercise Program Review: Opportunities for Models, Simulations, and Games (Agrait et al., 2003) – T&E requirements identified in this document were derived from objectives identified by the ThoughtLink team while observing ODP-sponsored exercises as well as non-ODP-sponsored exercises, and a review of exercise AARs from earlier NLD exercises.
- Exercise objectives contained in the materials developed by the ODP exercise contractors.
- Assessment of Federal Terrorism Preparedness Training for State and Local Audiences (FEMA) – Performance objectives and requirements, across multiple levels of responders; course objectives across multiple courses (i.e., courses provided by multiple agencies).
- Draft Department of Justice Exercise Evaluation Program (JEEP), August 2002. Note: This document was the precursor to the Homeland Security Exercise Evaluation Program (HSEEP). Sections of the HSEEP are still being written; when the document is complete it will be added to RRP.
- Draft Prevention Tasks, currently under development by ODP and a contractor team, March 2003.

2. DEFINITION OF REQUIREMENT CATEGORIES

The T&E categories were established and differentiated on the basis of several major instructional strategy attributes (also relating to exercising strategies). These were attributes that were judged to have a potentially important impact on the effectiveness of training and exercising. As such, the attributes distinguish how the training and/or

exercising processes should be conducted to most effectively achieve or support performance of all the items in the respective category.

Major elements of instructional strategy, deemed most appropriate for conduct of effective training and/or exercising, provided the rationale for defining each requirement category. Each category, therefore, contains a set of behavioral items that were judged to require a similar training and exercising strategy. The requirement categories were developed in parallel with extraction and review of the behavioral items.

The attributes used to define the T&E requirement categories, including potential alternative values for each attribute, are described below.

- **Student/Participant Unit** (Individual, group, small team, large-team) – Judgments were made of the preferred cost-effective and learning effectiveness context in which the students/participants should be trained/exercised. In many instances, training in groups is likely to be more cost effective than individual training because more people can be trained simultaneously for proportionally less cost per student. The cost per student can vary greatly depending on several factors, such as the media available (e.g., a CD ROM may offer the same training costs whether used to train individually or with several students in a lab training at their own pace).
- **Student/Participant Level** (Basic, advanced) – This addresses the level of instruction or exercise pertinent to the student/participant T&E needs.
- **Applied Context** (Non-specific, equipment) – This identifies whether the T&E requires the use of specific equipment. For example, the following T&E requirement necessitates the use of specific equipment: "Demonstrate the maintenance, selection, and use of appropriate equipment, to include personal protective equipment (PPE)."
- **Environment** (Generic, locale-specific) – This attribute states whether the T&E can be accomplished using a generic locale or requires a specific geographic area to be represented. Certain behavioral items can be achieved in a generic environment, while others require characteristics of a particular locale. Please note that specification of the "locale" value does not mean T&E must be conducted in the student/participant's actual city or region. It means that the T&E environment must embody the unique characteristics of the local city or region; these may be achievable using simulation, for example.
- **Content** (Knowledge, applied [application of knowledge, skills], hands-on) – This addresses the need for applied content in the training and exercises, from knowledge-only to hands-on applied exercises.

The requirement categories were based on combinations of the above attributes. Not all attributes were used for each category and not all attribute values were assigned.

The requirement categories were created in concert with review of each T&E requirement extracted from each data source. Each item was individually reviewed to determine the preferred strategy attribute choices for achieving effective T&E. Each category was thus established during review of the many behavioral items from the multiple sources.

This process resulted in the definition of 20 requirement categories, 18 of which contain training items; the remaining two represent only exercise items (see Table 2). Each item placed into a requirement category represents a recommendation that the training and/or exercising for that item should be accomplished in accordance with the training strategy attribute values that define that particular requirement category.

Table 2. Requirement Categories, with Their Defining Attributes

Requirement Category	Student/ Participant Unit	Student/Participant Level	Content	Environment	Applied Context
A	Individual	Basic	Knowledge	Generic	NS
B	Individual	Basic	Knowledge	Locale	NS
C	Individual	Basic	Applied	Generic	NS
D	Individual	Basic	Applied	Locale	NS
E	Individual	Advanced	Knowledge	Locale	NS
F	Individual	Advanced	Knowledge	Generic	NS
G	Individual	Advanced	Hands-On	Generic	Equipment
H	Individual	Advanced	Applied	Locale	NS
I	Individual	Advanced	Applied	Generic	NS
J*	Individual	Advanced	Applied	Locale/Generic	NS
K	Individual	Advanced	Hands On	Generic	Equipment
L	Individual/Team	Advanced	Applied	Generic	NS
M	Team	Basic	Hands-On	Generic	Equipment
N	Team	Advanced	Applied	Generic	NS
O	Team	Advanced	Applied	Locale	NS
P	Team	Advanced	Applied	Locale	NS
Q*	Team	Advanced	Applied	Locale	Equipment
R	Team	Advanced	Hands-On	Generic	Equipment
S	Team	Advanced	Hands-On	Locale	Equipment
T	Large-Team	Advanced	Applied	Generic	Equipment

* Denotes exercise-only categories.
NS: Denotes non-specific.

3. CONTENT OF REQUIREMENT CATEGORIES

The 20 requirement categories presented in Table 2 contain all of the items extracted from the multiple sources. Extracted requirements (from source documents identified earlier) identify many responder items that should be considered in ODP T&E. The behavioral data overlapped between sources but each also identified unique items that should be included in the comprehensive set. Rather than attempt to adjudicate the validity of the data sources, or that of the individual performance items, it was decided to combine the data from all the available sources.

At the time of this report, nearly 800 requirements have been extracted and placed into one of the 20 categories. The number of items per category range from 1 to over 110.

This categorization of the many requirements provides one set of criteria for evaluation of the MS&G media: the viability of individual media products to support each of the T&E requirement categories.

Observations regarding attributes[8] and the current requirement categorizations are discussed below. The accompanying graphs were produced in RRP.

a. Media Scale

Ten of the T&E categories recommend individual training exclusively (i.e., the preferred training unit is the individual; comprising 478 items), 8 categories recommended team training exclusively (comprising 404 items), and 2 categories contain both individual and training requirements (i.e., training at the individual and team levels are both appropriate).

b. Student Level

The consolidated list of behavioral items includes many more advanced level items than basic level items (580 items were advanced; 219 were basic). Five of these categories suggest basic-level students/participants. Fifteen of the categories suggest an advanced level (with 580 items).

As previously noted, the range of proficiency spans from basic to advanced level requirements. This attribute is not easily parsed because requirement levels are

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8 See Appendix A for attribute definitions.

characterized by different metrics. For example, two of the requirement source documents categorize levels differently: the Pelfrey report categorizes levels as Awareness, Operations, and Technician, while the Emergency Response Guidelines categorizes levels as Awareness, Performance, and Planning and Management.

Based on the team's exercise observations, interviews and document analysis, it was determined that the basic level (or corresponding awareness levels mentioned above) should include a wider range of requirements. For example, observation of full-scale exercises (FSEs) led the team to conclude that there were not only basic tasks that needed training prior to the FSE, but there were also senior-level tasks that also required training. As an example, based team observations and first responder interviews, it appears that there is a lack of awareness of tasks associated with Incident/Unified Command Systems.

c. Team and Student Level

Within the 10 team categories, only one category contains basic-level students/participant items, comprising 10 items; the other 19 comprised 391 tasks. As tasks become more advanced, they are more likely to be trained/exercised in a team context.

d. Environment

More than half the categories (i.e., 11 categories) suggest that T&E for those items can be effectively performed in a generic environment (comprising 466 items, or a little over half the total items). A locale-specific environment, meaning specific to the particular city or geographic region, is recommended for items in 8 categories (401 requirements; 1 category can be effectively trained/exercised both ways).

e. Content

Finally, only 4 of the 20 T&E categories indicate knowledge-only (comprising 185 items). An example of such an item is: "Know how to use the North American Emergency Response Guidebook (NAERG) published by the U.S. Department of Transportation." Some form of applied T&E content is recommended for items in the remaining 14 categories. An example of this item is: "Use the NAERG (or other available resources) to identify the hazardous material."

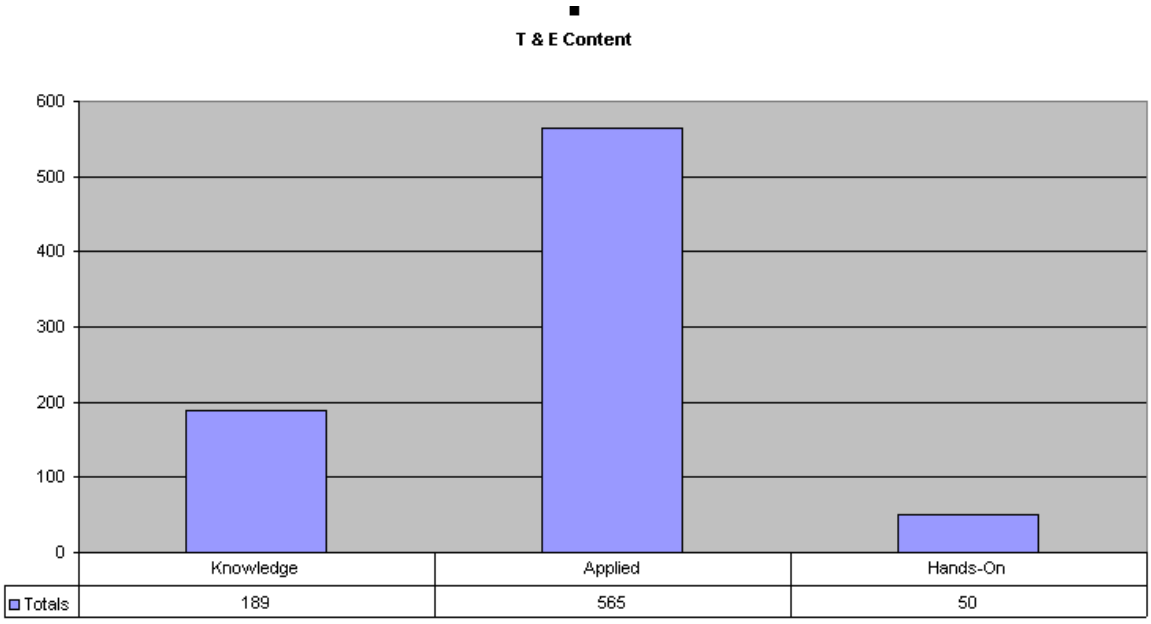

Figure 5. Distribution of Requirements Across T&E Content Category

f. Tasks Specific to Functional Areas

The chart shows the 444 T&E requirements that are *unique* to a functional area; the remaining 300+ requirements are common to multiple functional areas and are thus not included in the chart. It is interesting to note that there are few requirements unique to G.A. (Government Administrator) and PSC (public safety communications). From ThoughtLink's ODP exercise observations and interviews it seems intuitively reasonable to assume that the universe of G.A.-exclusive requirements has not been captured. The same could be said of PSC requirements. On the other hand, these interim results point to a great overlap in requirements among functional areas. This may have implications for MS&G's evaluated as some may fare better in comparison to others if they can be used across multiple functional areas.

The lack of exclusive Health Care and Public Health requirements could be explained by the following statement (mentioned in one of our requirement source documents): "The ODP leadership team excluded Health Care and Public Health from the disciplines subjected to further assessment since other federal agencies were developing training protocols for those disciplines' tasks."[9] Those few included in our database are in draft form from an ODP initiative to establish prevention tasks. Tapping into those other

9 Pelfrey, Kelly, and May, 2001, p. 18.

federal agencies' training protocols presents another opportunity for enhancing our database.

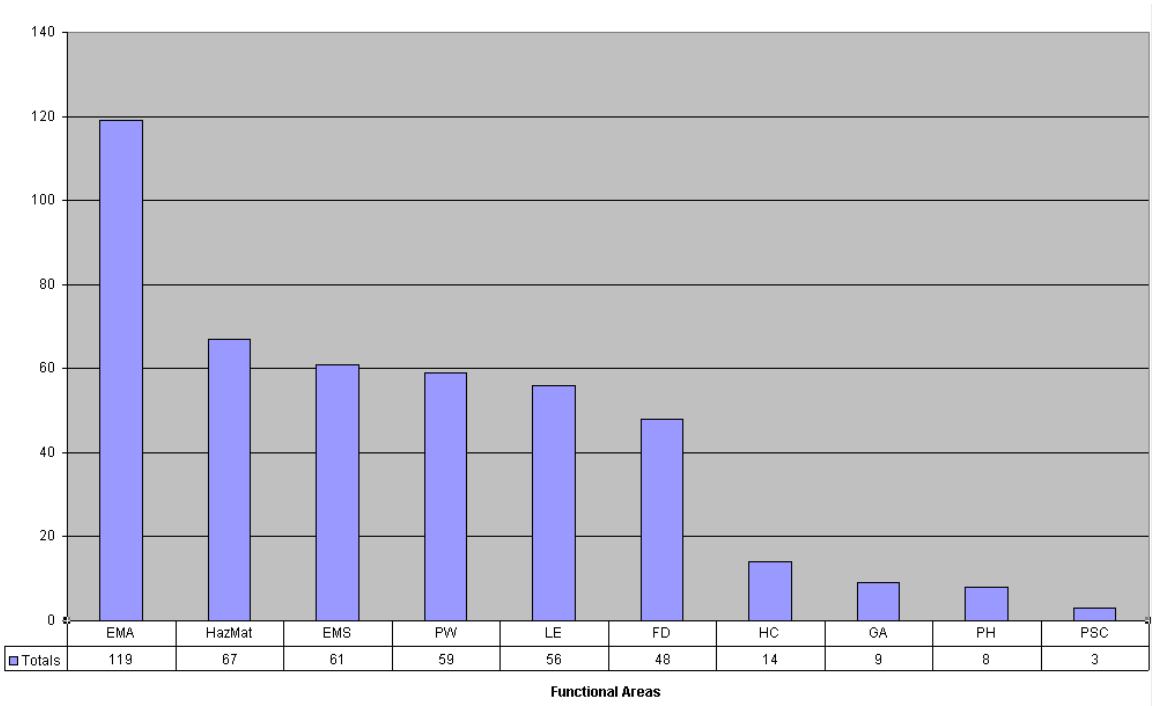

Figure 6. Functional Area-Specific Requirements

The lack of exclusive Health Care and Public Health requirements could be explained by the following statement (mentioned in one of our requirement source documents): "The ODP leadership team excluded Health Care and Public Health from the disciplines subjected to further assessment since other federal agencies were developing training protocols for those disciplines' tasks."[10] Those few included in our database are in draft form from an ODP initiative to establish prevention tasks. Tapping into those other federal agencies' training protocols presents another opportunity for enhancing our database.

10 Pelfrey, Kelly, and May, 2001, p. 18.

D. RATIONAL REQUISITEPRO

Early on, ThoughtLink realized the need for some kind of automated requirements management tool to help manage the hundreds of T&E requirements and their associated mapping to MS&G attributes and capabilities. Much of this project's success derives from correctly identifying ODP's T&E requirements and using that information to guide product evaluations. After a survey of applicable software, ThoughtLink decided to use IBM's RRP. RRP is a requirements management tool that allows you to maintain original requirements documents in Microsoft Word but provides the power of an underlying Microsoft Access database to help organize, sort, trace, and query requirements.

RRP offers a number of benefits. As mentioned earlier, original documents are accessible in their original Word format and requirements are flagged, becoming part of the underlying requirements database. Individual requirements then trace back to their source documents. For this project, individual product evaluations will also be stored in RRP, and product attributes and capabilities are included in the database. This supports mappings between the T&E requirements and the products themselves.

RRP also supports remote web access with multiple users. This feature supports ThoughtLink's distributed team. RRP also made it easy to define requirement categories, assign attributes to both the requirements and the MS&G products, and define hierarchical relationships.

The first step was to incorporate T&E requirement data sources into RRP. Hundreds of individual behavioral items were identified from various data sources.[11] Next, requirements from these sources were identified and linked to the categories ThoughtLink established. A traceable link to the specific source document is always possible as the requirement not only resides in the database, but also in the Word document where it originated. The training strategy attributes, including those defining the requirement categories and the additional strategy attributes considered, have been added into the RRP data base, and linked to the requirement categories. Finally, MS&G

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[11] For a listing of sources, see Section C of this document.

media characteristics are being placed in the RRP data base, for linkage with the strategy attributes, and eventually with the requirement categories. The RRP tool, which will permit flexible manipulation of the collected data, will facilitate this analysis process (and subsequent analyses of the extensive data base).

The remainder of this section describes in more detail how RRP is being used on this project.

A requirement is a rendering of a need, want, or expectation that is expressed by a stakeholder. In this project a requirement is defined as training and exercise system characteristics necessary to meet ODP's preparedness needs in the area of WMD. Requirements management is the process of identifying, organizing, documenting and tracking the changing requirements of a project. Though requirements should be unambiguous and verifiable this is not often the case. Because of the flexibility required to manage the large and diverse audience of this project ThoughtLink has adopted a Continuous Process Improvement approach. We believe this is an essential piece in improving ODP's T&E program and for this reason our approach is that of spiral development where continuous iterations and refinements are made. Our deliverables present a snapshot of current applicability of MS&Gs to augment ODP's T&E program.

The key steps in this kind of dynamic analysis include:

- Identifying needs at various levels of the organization – The analysis involves different jobs (e.g., health care workers) at different levels (e.g., EMS personnel and chiefs of medicine at hospitals).
- Formulating the real nature of the problem – Address the need for augmentation of ODP's T&E program in the area of WMD.
- Planning the changes in small, reasonable, and measurable steps describing both the goal, and the path to the goal – ThoughtLink broke the project down into phases including observation of the current exercise program and review of archived exercise information, and conduct of interviews to arrive at requirements with the ultimate goal to map those requirements to appropriate media (MS&G).
- Communicating the changes in terms of tangible, quantifiable achievements and activities in a way that is understandable to all levels of the organization – ThoughtLink has maintained an internal dialogue and coordination with its team members and developed relationships with ODP members as well as the exercise contractor support team.

RRP is an essential part of the dynamic analysis. It is used to comprehensively manage ODP's project requirements, while promoting communication and collaboration

among team members, and reducing the risk of missing critical pieces of information. RRP maintains live requirements documents (in Microsoft Word) that are dynamically linked to a database (Microsoft Access) for sort and query capabilities. As our interviews of ODP's T&E community revealed, most people use Microsoft Word to create different types of requirements documents. While documents are effective for capturing requirements, requirements stored in documents are difficult, or even impossible, to organize, prioritize, trace relationships between and track changes to requirements. This tool has been instrumental at allowing ThoughtLink to easily organize and manage ODP T&E requirements as they are uncovered, to trace relationships between them, and track changes that affect them (more on this in Section E of this document).

RRP has helped us manage the tremendous amount of data acquired from the onset of the project. As depicted below, in Figure 7, the Process Improvement Program will continue iterating through the life of the program. The focus is the current T&E program where ThoughtLink continuously seeks to:

- Assess its Current State – Which requirements are being met, which are not, and which could be augmented?
- Formulate a Goal – Provide a comprehensive T&E program to the response and planning community in the area of WMD.
- Identify Gaps – Propose landscape of promising areas for MS&G.
- Plan Process Implementation – Provide ODP with a road map outlining where MS&G fit in the cycle and the most efficient ways to implement this (e.g., a comprehensive T&E curriculum that includes MS&G).

The remaining two tasks are important culminating elements in the process but are outside the scope of ThoughtLink's role on this project.

- Execute Process Implementation – Incorporate chosen MS&Gs into ODP T&E program curriculum,
- Evaluate Program Implementation – Revise curriculum as requirements continue to evolve.

To understand the impact of requirement changes, and with the aid of RRP, we have coded each requirement and tool with chosen attributes. Attributes help us track important details about requirements such as functional area (e.g., fire department personnel), user unit (e.g., individual vs. team), etc.

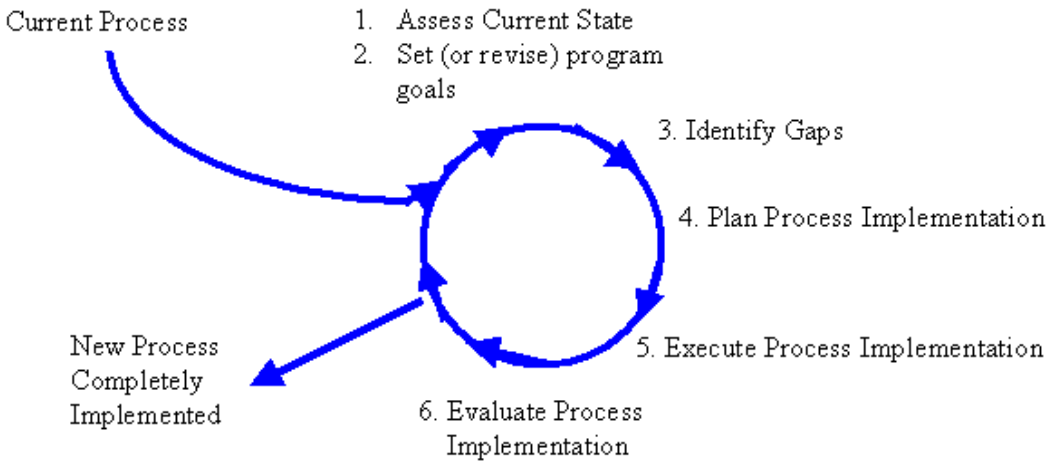


Figure 7. Continuous Process Improvement

Internal to this process cycle are mini-cycles throughout each phase of the project, as depicted in Figure 8.

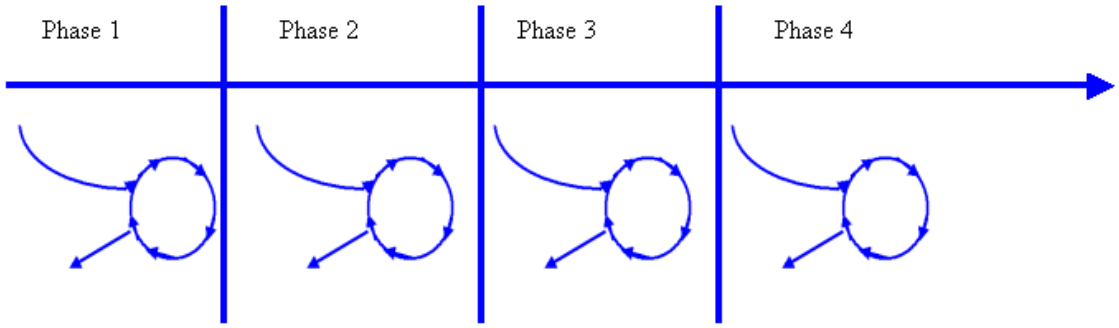


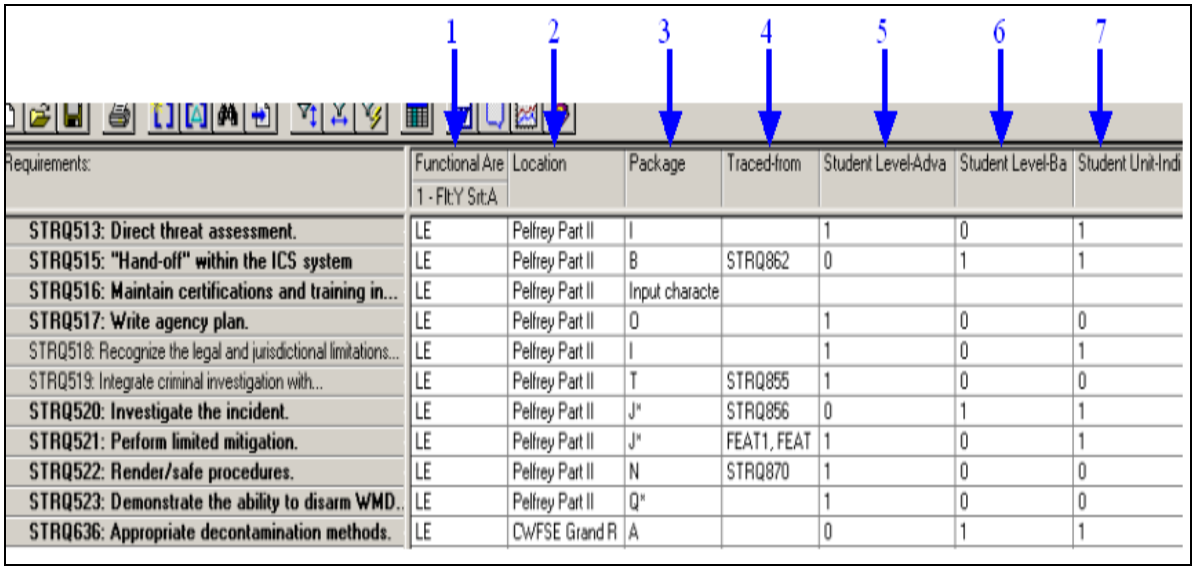
Figure 8. Repetitive Process Improvement through Program Cycle

Sort and filter capabilities enable us to view only the requirements information that is relevant to the team at specific times in our project. As depicted below in Figure 9, the requirements are listed in rows, and their attributes appear in columns. The attributes presented here, listed from left to right, are:

1. Functional Area – The LE designation signifies these are all law enforcement-exclusive tasks.
2. Location – Indicates the source document from which the requirement was extracted (and where it still resides, as RRP imports requirements into a

database and also "marks" them in the original document, thus enabling traceability). All of the requirements displayed were extracted from ODP's Emergency Responder Guidelines (those are all abbreviations for that source document).

3. Package – Indicates the T&E category in which a requirement has been placed (i.e., requirements were "filed" on one of 20 folders based on the attributes describing a package).
4. Traced-from – Indicates which requirement this is traced to. Tracing is useful in establishing relationships between requirements. For example, a trace could be made between an exercise requirement and a training requirement, establishing the training requirement as a pre-requisite for exercises, thus providing guidance as to what preparation is needed to exercise efficiently.
5. Student Level Advanced – Where a rating of "1" would classify this as an advanced task (as opposed to basic), and a rating of "0" would not.
6. Student Level Basic – where a rating of "1" would classify this as a basic task (as opposed to advanced), and a rating of "0" would indicate it is not a basic level task.
7. Student Unit Individual – where a rating of "1" would classify this as a appropriately trained/exercised at an individual level (as opposed to in a team), and a rating of "0" would mean that is not the appropriate training/exercise unit.



Requirements:	Functional Are 1 - Flt:Y Sit:A	Location	Package	Traced-from	Student Level-Adva	Student Level-Ba	Student Unit-Indi
STRQ513: Direct threat assessment.	LE	Pelfrey Part II	I		1	0	1
STRQ515: "Hand-off" within the ICS system	LE	Pelfrey Part II	B	STRQ862	0	1	1
STRQ516: Maintain certifications and training in...	LE	Pelfrey Part II	Input characte				
STRQ517: Write agency plan.	LE	Pelfrey Part II	O		1	0	0
STRQ518: Recognize the legal and jurisdictional limitations...	LE	Pelfrey Part II	I		1	0	1
STRQ519: Integrate criminal investigation with...	LE	Pelfrey Part II	T	STRQ855	1	0	0
STRQ520: Investigate the incident.	LE	Pelfrey Part II	J*	STRQ856	0	1	1
STRQ521: Perform limited mitigation.	LE	Pelfrey Part II	J*	FEAT1, FEAT	1	0	1
STRQ522: Render/safe procedures.	LE	Pelfrey Part II	N	STRQ870	1	0	0
STRQ523: Demonstrate the ability to disarm WMD..	LE	Pelfrey Part II	Q*		1	0	0
STRQ636: Appropriate decontamination methods.	LE	CWFSE Grand R	A		0	1	1

Figure 9. Sample Report Showing Requirements and Their Attributes

Traceability allows us to define the relationships between requirements and other requirements, and between requirements and evaluated products, to ensure that nothing falls through the cracks and to validate that the system does what it was intended to do.

The following screen shot shows an example of traceability between requirements and products. Figure 10 shows that four tools evaluated in the current round of evaluations (ADMS, CORE, Emergency: Fighters for Life, and EMS Simulator) map onto the package labeled A. This package contains requirements, from multiple sources, describing tasks characterized in the following way:

Requirement Category	Student/ Participant Unit	Student/Participant Level	Content	Environment	Applied Context
A	Individual	Basic	Knowledge	Generic	NS

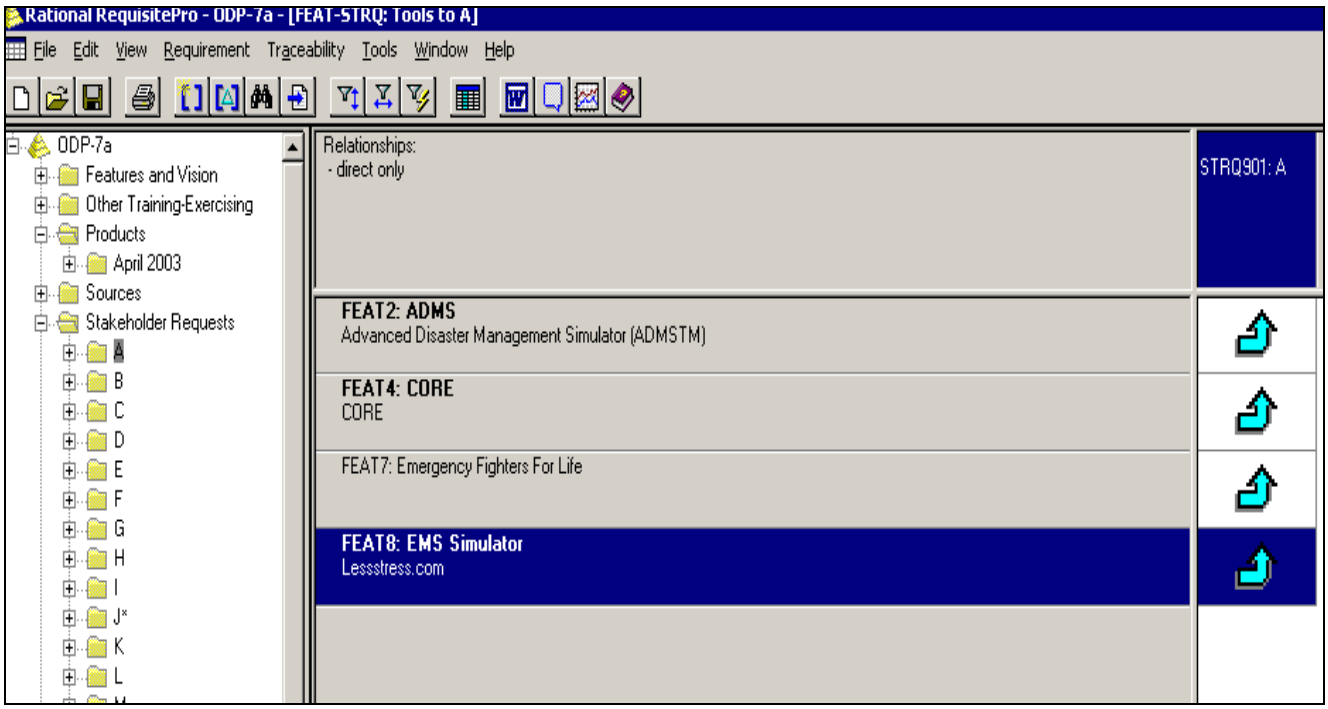


Figure 10. Sample Mapping of Products to T&E Category

Traceability is a useful feature in RRP that allows the effect of requirement changes to be managed. When traceability is established between two requirements, any change to one requirement means that the traceability relationship must be re-examined to see whether it is still valid (e.g., if the tool still maps to the T&E category thus presenting ODP an effective T&E strategy).

Another useful, timesaving feature of RRP is its reporting capability. Although our aim when identifying requirements was to subsume them into meaningfully distinct categories for ease of analysis, it is often necessary to refer to the individual requirements and/or quickly organize them into different categories. For example, it is often useful to inspect those requirements that are exclusively exercise requirements or exclusively training requirements. Reports are highly customizable and can be created by selecting the desired attributes as filters. For example, Figure 11 is a sample report for all Government Administrator requirements (to date) with a selected attribute (in this case Applied Context: Equipment/Non-Specific). The left-hand side displays the numbered requirements and the columns on the right show which require training or exercising with specific equipment (where zero means no and one means yes) and which do not. Thus, based on the ratings, none of the displayed requirements require training/exercising with the use of job-specific equipment.

Requirements	Applied Context-Equipment	Applied Context-Non- specific
STRQ486: Understand the use of existing continuity of government plans.	0	1
STRQ487: Use an integrated approach chief elected officials. Be able to use an integrated approach, based on local laws and policy of chief elected officials.	0	1
STRQ488: Establish policy and executive orders to meet the exigencies of the incident.	0	1
STRQ489: Formulate, in conjunction with other jurisdictions, vision for recovery. Be able to formulate, in conjunction with other involved jurisdictions, an integrated public policy vision for recovery.	0	1
STRQ490: Team approach to enhance decision-making. Understand the processes for developing a team approach, able to enhance decision-making skills to be used during a WMD incident.	0	1
STRQ491: Synthesize roles of governmental officials Be able to synthesize roles and responsibilities of governmental officials with those of emergency management agency officials in orchestrating resources and responses to a WMD incident.	0	1
STRQ492: Exercise emergency powers. Understand and exercise as appropriate emergency powers and declarations among local, state, private, and federal entities	0	1
STRQ876: *Understand and exercise as appropriate emergency powers and declarations among local, state, private, and federal entities (GA)	0	1
STRQ878: *Understand role and responsibilities during a WMD incident (GA)	0	1

Figure 11. Sample Report Showing Selected Attributes Associated with Government Administrator-Exclusive Requirements

E. REVIEW OF TRAINING AND EXERCISE PRODUCTS

1. OVERVIEW

This section describes work related to analysis task 2, Review Media, and task 4, Link Media with Strategy Attributes and T&E Requirement Categories. The full set of five analysis tasks is shown below in Figure 12; tasks described in this section are shaded.

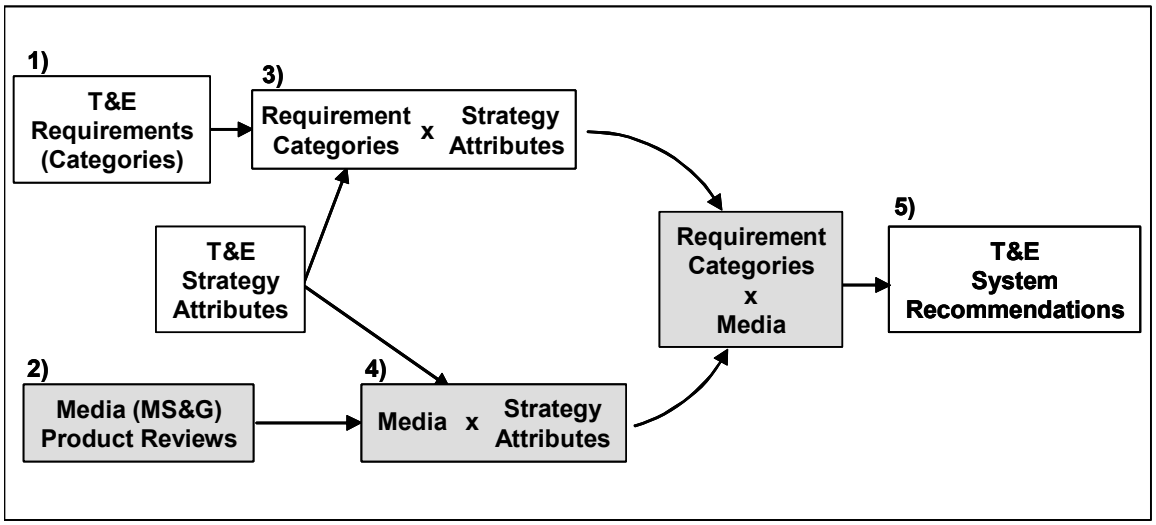


Figure 12. Analysis Tasks

Task 2, Review Media – Potentially relevant MS&G products were identified from a variety of sources, including homeland security conferences, personal contacts, discussions with ODP exercise planners and participants, and ODP staff. An initial list of products was submitted to ODP who approved it for in-depth review. The product reviews for this initial set of 17 products, listed below along with abbreviations, took place from October 2002 through April 2003.

Table 3. List of 17 T&E Products Reviewed in the First Round

Product	Abbreviation
Abbottville Tabletop Simulation	ATS
Advanced Disaster Management System (ADMS)	ADM
Angel Five	A5
CMS (Crises Management System)	CMS
Competency Observation Recording & Evaluation (CORE)	COR
CRISIS	CRI
Decision Making Skills for Public Officials During a Hazardous Materials Incident	DMS
Emergency: Fighters for Life	EFL
Emergency Preparedness Incident Command Simulation (EPiCS)	EPI
EMS Simulator	EMS
Human Patient Simulator	HPS
Multi-Layer Decision Simulation (MLADS) – school violence	MLD
NBC CTS 2000	NBC
PISCES (Pollution Incident Simulation, Control, and Evaluation System)	PIS
Rainbow 6	R6
Virtual Emergency Response Training Simulation (VERTS)	VER
WMD Basic Awareness Training Interactive CD	WBA

The 17 products reviewed in this initial phase included a wide range of MS&G products ranging from individual to team, basic to advanced, supporting multiple functional areas and having various levels of fidelity. The product types included a tabletop physical model; PC-based and Internet instructional programs; PC-based tools and games; a physical simulation; large team simulations for conducting exercises and training; and a remote exercise control/monitoring/data-collection tool. Both commercial and government developers are represented in this sample. Short one-page descriptions of the products can be found in Section F.

The review process entailed a survey of functionality and equipment needs, and requests for information from developers and current product users, via interviews,

telephone, or email. If possible, informational surveys were augmented by either trial use of the product, or observation of a supported training or exercise event by the reviewer.

Each of the designated products was reviewed in depth by the project team; each team member reviewed several products. The reviews were performed in accordance with a template, which directed attention to specific product-related issues. These reviews have narrative responses for many fields and constitute a collection of Microsoft Word documents. The product review template can be found in Appendix B; complete reviews are found on the CD accompanying this report.

A qualitative analysis of the data was performed. Each team member rated a subset of products with regard to multiple attributes. (These attributes and definitions can be found in Appendix A.) These data were collected in an Excel spreadsheet, in which the MS&G are rows and important attributes are columns. Some of the rated attributes stemmed from a T&E focus (e.g., type of training audience), or functional areas supported, while others have a product focus (e.g., is the product a board game, software or hardware). Finally, some of the numerical data from the Excel spreadsheet were entered into RRP for analysis, including linkages between products and the T&E requirement categories.

In order to ensure as much consistency as possible in the ratings, a structured subjective process was used. Criteria for ratings were defined based on the team's expertise with instructional design and pertinent literature. Team members developed a shared perspective on the criteria and ratings through lengthy discussions of each member's ratings. After the 17 products were rated, the ratings were re-calibrated. One team member was responsible for input of all ratings and consulted with each rater to clarify data and ensure a shared schema prior to mapping products to T&E requirement categories. This helped reduce rater variance (variance/error in ratings due to user and not construct differences).[12]

Rating products by how well (or whether) they meet the various T&E attributes is a key component of the overall methodology. This allows us to create a link between products on the one hand and T&E requirement categories (which include strategy attributes) on the other; this is task 4.

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[12] K. R. Murphy and J. N. Cleveland (1995). *Understanding Performance Appraisal: Social, Organizational and Goal-Based Perspectives*. Thousand Oaks, CA: Sage Publications.

Task 4, Link Media With Strategy Attributes and T&E Requirement Categories – Each of the media (MS&G products) was considered with regard to its ability to support each of the instructional strategy attributes identified in task 3 (described in Section C). In addition, media attributes potentially relevant to the support of training and exercising processes (e.g., target audience, such as police, fire, EMS; AAR-support capability) were identified and evaluated with regard to each product. These analyses yield a profile for each product, similar to the profile for each requirement category. Importantly, both the requirement categories and the media have profiles based on the instructional strategy attributes. These profiles will be an important basis for judging the viability of each product to support the ODP T&E process, and for making recommendations addressing the ODP T&E system.

The remainder of this section includes a detailed discussion of the results of the task 2 analysis, Review Media, and the results of the task 4 analysis, Link Media with Strategy Attributes and T&E Requirement Categories.

2. REVIEW MEDIA (TASK 2)

a. Overview

The 17 products reviewed here represent a fraction of MS&G products currently available or in development. Product observations are discussed below. Conclusions and recommendations, however, will not be made until later in the project, after MS&G from all three rounds of product evaluations have been assessed.

The following sub-sections present and discuss the aggregated results of the product evaluations, considering various technology features and T&E features. (A more detailed description of the link between products and T&E requirements follows in section E.3.)

Data were collected and rated for numerous attribute categories in the database, using two main guidelines: (1) The attributes were to be judged for the *existing version* of the product, as it was typically used for its (2) *primary purpose*. The coding method provides for mutually exclusive conditions (e.g., two ratings for the same attribute were not possible), uncertainty (for reasons such as incomplete product development at the time of evaluation), and inapplicability (e.g., the "use of equipment" attribute may not apply to all products). Three ratings were possible for each attribute category, each was assigned a numeric code in the spreadsheet:

- Product does not support the given characteristic or that characteristic does not apply to the product (coded as 0)
- Product supports the given characteristic (coded as 1)
- Product potentially supports the given characteristic (coded as 2). This might be caused by a number of factors: insufficient information, difficulty in interpretation given the attribute definition, or support of a given attribute is relatively indirect.

The aggregate of these ratings is meant to be a "snapshot" of products as of the preparation of this document, and may not reflect any future changes that vendors might make to any of these products. Similarly, these results are not intended to be exhaustive, but rather to be indicative of this round of product evaluations. Observations begin at a general, broad level and then proceed to increasing levels of detail. Select rated attributes for each product can be found in Appendix C.

b. Analysis of Product Data

There are any number of ways to analyze these products, but there are fundamental questions that deserve attention: who, where, how, and how much?

- Target audience – For whom are these products designed?
- Location – Where does learning or T&E take place?
- Training – What kind of learning, training, or exercising do they support?
- Relative cost – What does it cost, relative to other products?

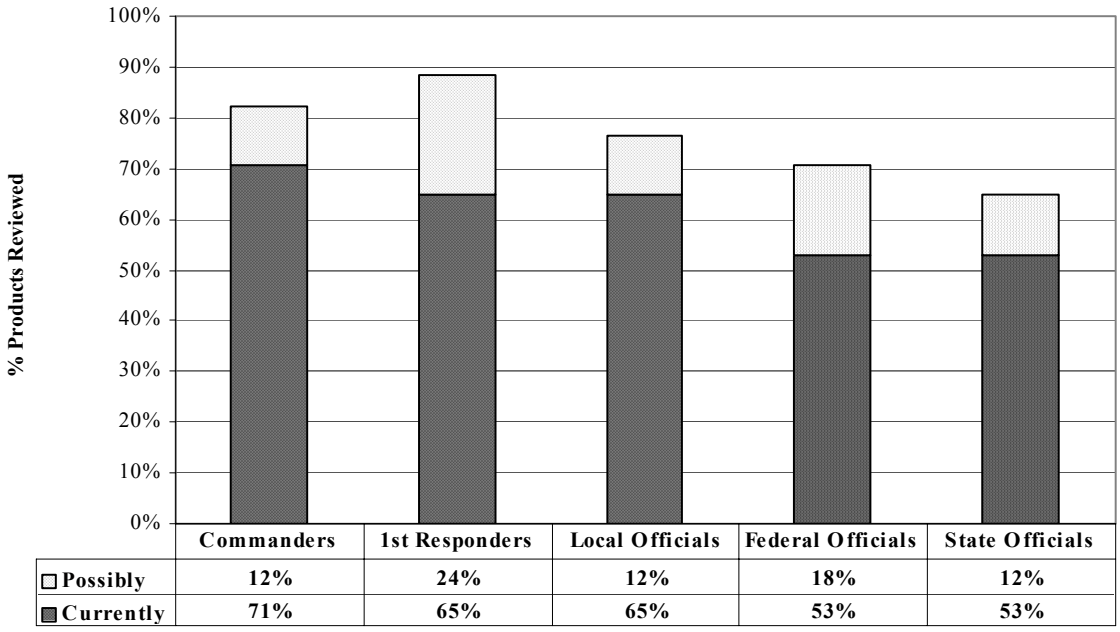
This section presents summary statistics of product attributes in the form of frequency distributions to provide an overview of breadth and depth of data collected. These results are not intended to be exhaustive, but rather to be indicative of this round of product evaluations.

1. Observations Relating to Target Audience (Who?)

Four attributes of a product help to define its applicability to certain users: its intended target audience, the functional job areas that it covers, the types of training supported, and the levels of training to which it applies. The charts below are sorted to position highest currently supported attributes to the left. Percentages indicate the portion of the total sample of products, with seventeen being 100 percent.

Currently, we identify five audience types: first responders, commanders, and local, state, and federal officials. Functional job area covers organization types:

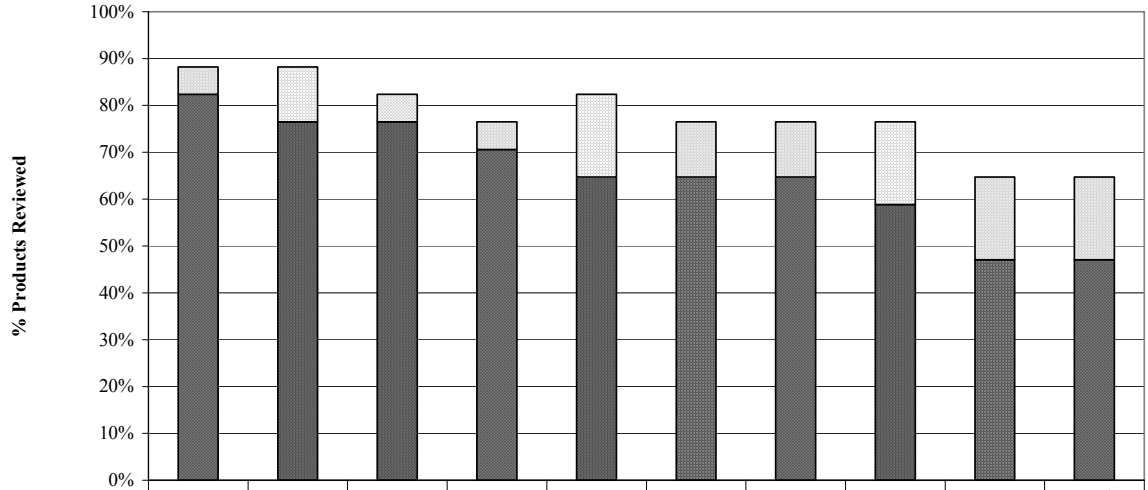
emergency medical service (EMS), emergency management agency (EMA), fire department, government administration, health care, HazMat, law enforcement, public health, public safety communications, and public works. Multiple levels of training span from simplified to complex training types. These are: awareness, part-task, equipment, pre-training prior to exercises, drills, table top exercises (TTX), functional exercises (FE), full scale exercises (FSE), FSE reinforcement, distributive/collaborative training, and exercises of national scope. Five levels of WMD-related training are identified: awareness, performance (which is equivalent to operations), technician, planning and management (which includes incident command system (ICS)), and high-level command and control/multi-jurisdictional.



	Commanders	1st Responders	Local Officials	Federal Officials	State Officials
Possibly	12%	24%	12%	18%	12%
Currently	71%	65%	65%	53%	53%

Figure 13. Percent of Products, by Target Audience

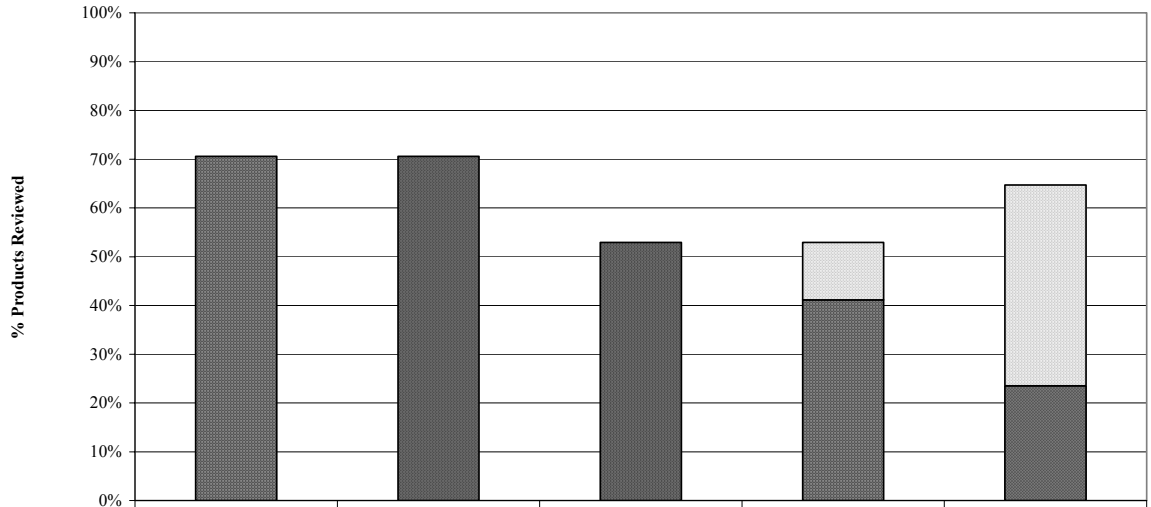
Products were rated as supporting one or more target audiences. A majority of products targeted the audiences of interest, with commanders being the most commonly targeted user type, followed closely by first responders and local officials. This corresponds to the requirement analysis (presented in section C) which exhibited a much larger number of advanced level requirements (vs. basic) and many more applied requirements (vs. knowledge only). Given this small sampling of MS&G products, it would be premature to draw any general conclusions about targeted audiences.



	EMS	LE	EMA	Healthcare	Fire	HazMat	Public Health	Public Works	Govt. Admin	Public Safety Comms
Possibly	6%	12%	6%	6%	18%	12%	12%	18%	18%	18%
Currently	82%	76%	76%	71%	65%	65%	65%	59%	47%	47%

Figure 14. Percent of Products, by Functional Area

The top three functional job areas supported by these products were, in order, EMS, LE, and EMA. The areas least supported in this round of products were government administration, and public safety communications. It is evident from the above chart that a majority of these products support first responder types of functions.



	Performance (Operations)	Plng & Mgmt. (incl. ICS)	Technician (Specialist)	Integrated Systems (multi-jurisdictional beyond IC level)	Awareness
Possibly	0%	0%	0%	12%	41%
Currently	71%	71%	53%	41%	24%

Figure 15. Percent of Products, by ODP Training Level

The chart and table above, showing the proportion of products that support the ODP-defined training levels, is notable because of the low level of current, targeted support for awareness training in this product set. Only 24 percent of the products surveyed were judged to address WMD awareness, whereas 41 percent were judged to potentially support such awareness (meaning that upon further review they may not support awareness T&E). There may be several reasons for this result: product selection bias or this sample statistic may possibly be representative of low levels of awareness training treated by the MS&G product population. It is premature to draw any conclusions in this regard, but the awareness statistic is one that will warrant continued attention in subsequent product evaluation rounds.

To summarize user profile observations, we find that first round products commonly support the first responder community in terms of job level and function. Functional exercises for performance, and planning and management training levels is well represented in this sample. The initial sample of products shows lower support providing T&E for state and federal officials, and low support for awareness training. It is too early to know whether this is in fact characteristic of current MS&G or whether the first round of products did not include such products. This will be considered in subsequent round of product evaluations.

2. Location Observations (Where?)

Location is a term that pertains to the (physical) training site and the training environment. A significant attraction to MS&G is the ability to separate the two, in that a virtual environment may replace an actual physical locale for training purposes. Modeled or simulated training environments ("constructs") can therefore help to minimize or avoid costs for concurrently collocating people, equipment, and facilities. The products reviewed in this round exhibit a wide variety of construct fidelity, ranging from generic board-game or computer-based models to high-resolution, 3 dimensional geo-specific models.

For many types of training and exercising, incident response must be specific to a given location in order to meet the training objectives. Generally, such location specificity is provided either by the vendor (e.g., high resolution 3D models of specific cities in VERTS), by the user (e.g., site staffing and inventories in the NBC product), or by a third-party vendor (e.g., nautical charts for PISCES). We have observed in this round that products that offer vendor-provided location specificity are generally limited to very few locales. For example, a highly detailed, geo-specific model of Chicago's

O'Hare airport exists (in the ADMS product), but this may not serve the needs of any other city if high training value is associated with specific geo-cultural features. In cases where high fidelity 3D models do not currently exist, vendors can customize their products to new locations with additional cost and lead time. Conversely, products offering generic environments were readily available. Generally, the degree of location specificity was found to diverge from product availability.

Ten reviewed products support location specific training, seven of which support both generic and geo-specific locations. These seven MS&G (ADMS, CMS, CORE, CRISIS, HPS, NBC, PISCES) are microprocessor-based training media. Technologically advanced media, given modular design and standardization, allow for modification by users or third-party vendors and thereby support adaptability. We observed that products geared toward training and exercising Incident Command generally operate in a construct (a physical tabletop model, or computer model), and have relatively limited location specific models. While such products afford the ability to separate the construct from the actual location for training purposes, they often require significant scenario planning and model adaptation to provide training veracity. The full-scale exercise product (PISCES), on the other hand, may require physical collocation of trainees, equipment, and facilities. This comes at the cost of trainee/participant travel, mobilization of real resources, and other potential safety and logistical matters.

User requirements will determine the choice for generic versus location-specific training environments. As noted in Section C, more than half (54 percent) of the total training requirements collected to date do not require use of location specific media.

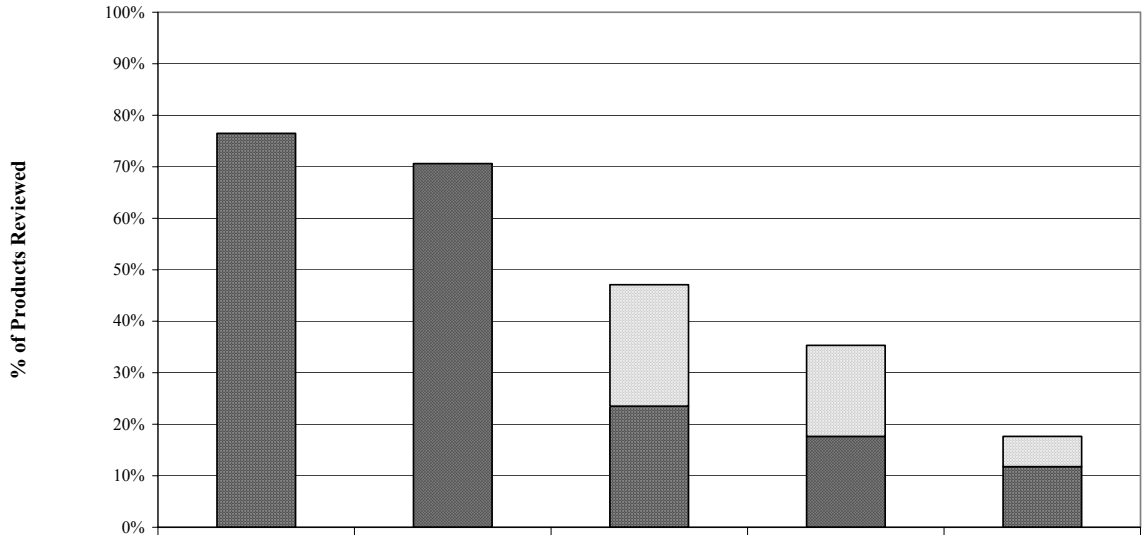
3. Training Observations (How?)

This section provides an aggregate view of how these products are used in practice. The dimensions of process and product functionality frame this view. Note that material presented here does not replace the requirements analysis performed using RRP to map products to training strategies (i.e., the recommended use of MS&G based on requirements and T&E strategies). The following characteristics yield a sense of how training is performed:

- Application environment
- Supported training types
- Supported WMD event types
- Supported learning types

- Learning/teaching methodology (self-paced vs. instructed or facilitated)
- Product reusability or "replayability"
- After-action review (AAR) support.

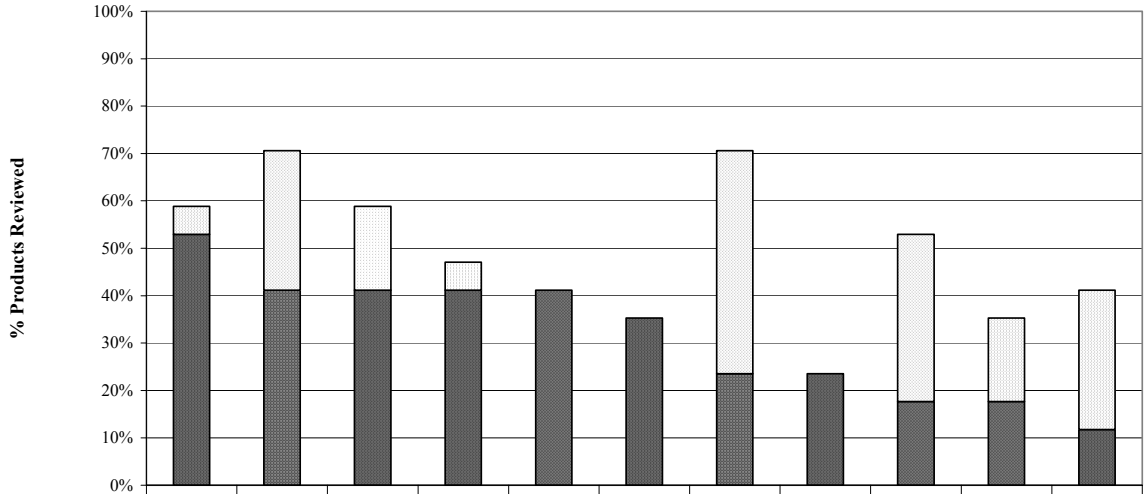
Five types of applications are identified in this round of products: training, operations, planning, analysis, and entertainment. To date, there are eleven supported training types identified: awareness, part-task training, pre-training, drills, equipment training, distributive/collaborative exercise, FE, FSE, FSE reinforcement, and national training exercises (e.g., Top Officials Exercise (TOPOFF)). Learning types are threefold: initial acquisition, improvement, or maintenance/refresher, or a combination of those. Self-directed learning or training is distinguished from instructor-led sessions. The last two categories, replayability and AAR capability, attempt to rate the level of "dynamism" in a product. Replayability distinguishes between sessions that potentially have numerous, unpredictable outcomes (driven by stochastic simulation engines, either human or computerized) versus those that are restrained by static/fixed event drivers. Alternatively, this attribute can be interpreted as support for multiple, un-predetermined outcomes. AAR capability has four attributes describing whether recommendations and user performance data are provided or only performance data are provided; whether recommendations and performance data are created by the product or by a subject matter expert (SME); and if the product can replay events that occurred in the T&E.



	Training	Exercise	Operational	Analysis	Entertainment
Possibly	0%	0%	24%	18%	6%
Currently	76%	71%	24%	18%	12%

Figure 16. Percent of Products, by Application Environment

A significant majority of the reviewed products pertained to training and/or exercising as their primary application environments. The five categories are not mutually exclusive; a number of products could potentially support operational or analytical roles even though they were not originally intended for such application.

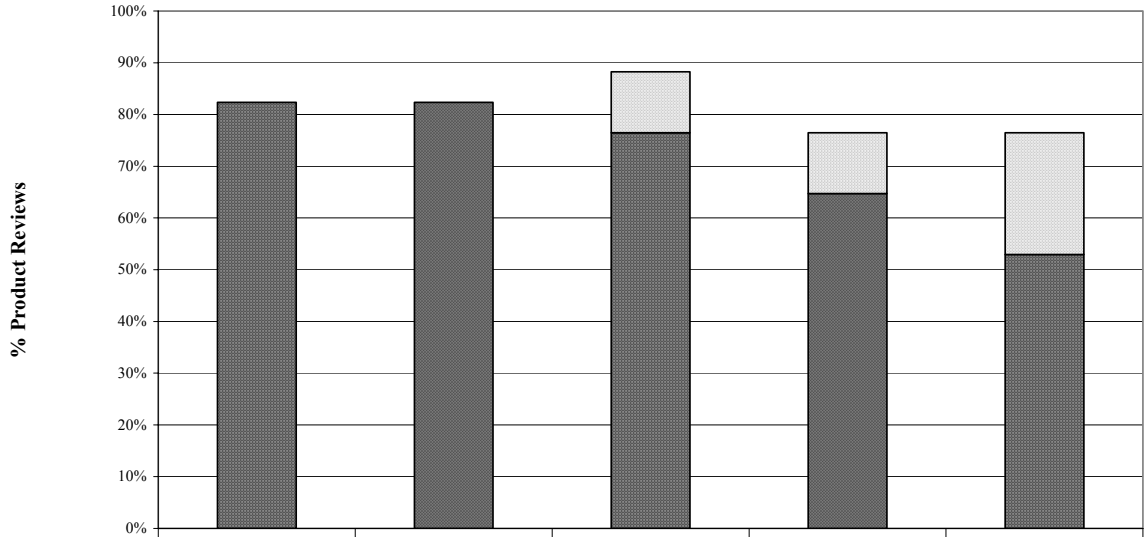


	FE	Pre-Trng	TTX	Drills	FSE	FSE Reinf.	Aware	Natl. Training Exercise	Part Task Trng	Dist., Collab. Exercise	Equip. Trng.
Possibly	6%	29%	18%	6%	0%	0%	47%	0%	35%	18%	29%
Currently	53%	41%	41%	41%	41%	35%	24%	24%	18%	18%	12%

Figure 17. Percent of Products, by Training Type

Functional exercises are the type of training most frequently supported by the sample of products. The next tier of support, at 41 percent of reviewed products, covered pre-training, TTX, drills, and FSEs. A significant proportion of products might potentially support awareness training, but the data suggested that many products would not address this type of training efficiently. The same observation can be made for pre-training, part-task training, and equipment training, in that the product could potentially be used for these types, but may not be the preferred training mechanism.

The distribution of supported WMD event types appears to be related to two factors - the existing capability of first responder organizations to deal with relatively common chemical spills and explosions, and the relative ease with which events can be transferred from simulations to real-time training and exercises. Although a slim majority of products currently support biological event T&E, many vendors identified multi-hour or multi-day incubation periods as a problem for real-time simulations. This is not, however, a problem for simulations that can accelerate event time.



	Chem	Expl	Rad	Nuc	Bio
Possibly	0%	0%	12%	12%	24%
Currently	82%	82%	76%	65%	53%

Figure 18. Percent of Products, by WMD Event Type

Of the reviewed products, 88 percent supported maintenance/refresher learning, 76 percent supported improvement, and 71 percent supported initial acquisition learning (note that products can support more than one type of learning thus the percentages will not add up to 100 percent). This result may initially appear counterintuitive, but accords with similar observations on awareness training. The learning/teaching methodology of products in this sample was observed to be related to other product training attributes. Products that were rated to support primarily instructed or facilitated sessions appeared to be closely related to ratings of improvement and maintenance/refresher learning, dynamic replayability, and SME-provided AAR. These results may be an artifact of selection bias or reviewer judgment. Yet, if these sample results are representative of the wider population of MS&G products, this may show a preference on the part of the first responder training community for direct instruction by a subject matter expert for improvement and refresher learning. Products that show this relationship are: ATS, ADMS, CMS, CORE, CRISIS, EMS, HPS, MLADS, NBC, PISCES, and VERTS.

4. Cost Observations (How Much?)

It would be remiss to rate the relative merits of MS&G products without some sense of the relative costs. Yet, simple cost-benefit analysis for such a diverse group of

products would not be particularly meaningful, due to the wide range of uses, functionalities, physical implementations, degrees of adaptability, among many other characteristics. For example, it is of limited value to compare the cost of a single user entertainment-oriented computer game to a simulated EOC command system. Additionally, many vendors cannot provide specific cost information without defined user requirements. Cost data, therefore, were characterized in one of four ways: actual (known) costs or quotes, typical costs, or minimum and maximum likely costs.

Despite these limitations, we developed multidimensional plots that suggest relative value according to a particular domain and a given "value dimension." In the following two charts, "potential" cost is plotted on a log scale y-axis, and the application environment is the domain plotted on the horizontal x-axis. Potential cost is essentially synonymous with maximum likely cost of a fully featured product (that may require auxiliary modules or products for full benefit). A third dimension indicates relative value by the size of the circle or bubble (larger bubble means more potential value). In the first chart, the bubbles indicate the percentage of the eleven training types (e.g., functional exercise, and equipment training) the product supports.

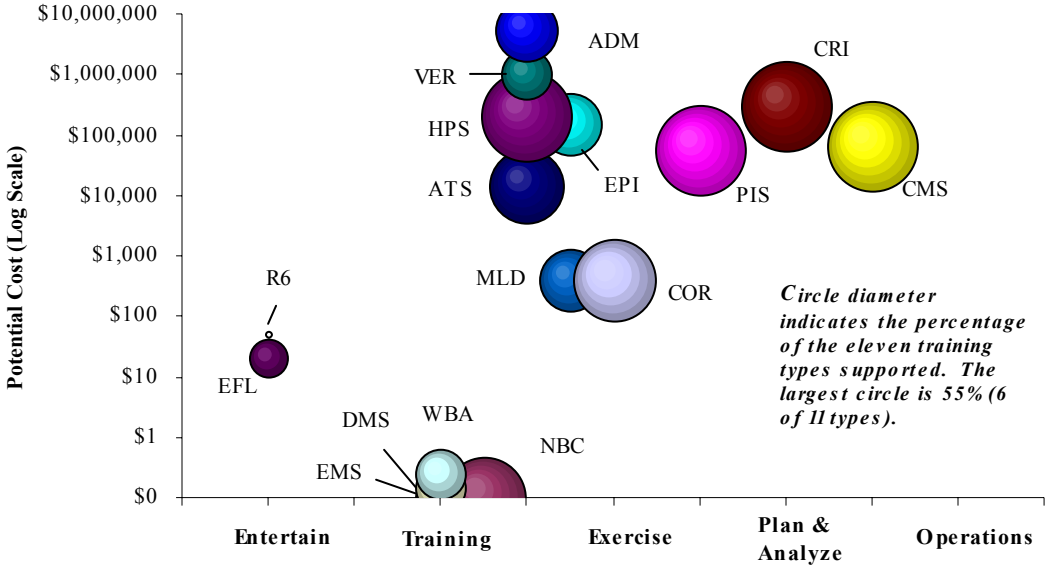


Figure 19. Potential Package Cost vs. Application Environment, by Training Type

Because the Angel Five (A5) product is not available to users outside of the FBI, cost data is irrelevant and the product is therefore not plotted. We can make a number of observations from this chart:

There appear to be four identifiable clusters of products.

- Low cost entertainment oriented games– (R6, EFL)
- No charge software and computer-based training aids or devices (DMS, EMS, WBA, and NBC)
- Relatively costly, high veracity T&E products, directed toward Incident Command training or immersive, virtual reality training (ATS, VER, ADM, EPI)
- Relatively costly planning/analysis and operations-oriented systems (PIS, CRI, CMS).

The cost dimension spans five to six orders of magnitude, depending on product configuration, staff training and other variables. Most products are clustered in the T&E domain, and costs range from hundreds of dollars to millions of dollars. While complex systems afford the greatest number of training types (indicated by bubble size), some products may be equally or more costly.

There are many reasons why products may be more costly, and it is tempting to ask the question – Is it worth it? The same approach as the chart presented above, with potential costs on a log scale versus application environment, could be used to normalize another "value dimension" and compare the relative sizes of the new chart bubbles with the previous chart. Suppose the user is interested in the degree to which a product supports either or both generic and specific locations. We generate a scale in which a full rating (100 percent) goes to products that support both generic and geo-specific location models; a 75 percent rating goes to products that currently support specific and possibly support generic locations; and a 25 percent rating is given to products that only provide generic locations. Product bubble sizes are calculated in this manner, with the largest bubbles indicating 100 percent. The chart generated, below, is quite similar to the preceding chart. Generally speaking, then, we observe that support for location specificity is an attribute that contributes to cost.

Operations oriented systems provide the highest degree of locational value; whereas fictitious games and some free training aids/devices provide the least. T&E oriented systems, to varying degrees, provide substantial or maximum locational value, typically through custom model development by the vendor. Without the details of each product review, it is not readily evident to the reader why products in the upper region of the T&E domain are equally or more expensive than the three products in the planning/analysis, and operations domains. Our observations from this sample of MS&G products suggest that high-resolution systems intended primarily for Integrated

Command training or immersive simulation tend to require significant customization to represent geo-specific features and infrastructure (including surface rendering). In contrast, products in this round of reviews oriented toward planning/analysis and operations did not require the same degree of customization to meet their primary missions. These types of products, aimed at real-world resource management, do require extensive locational databases mainly related to mapping and real-time capture of such data as asset geo-positioning and weather conditions.

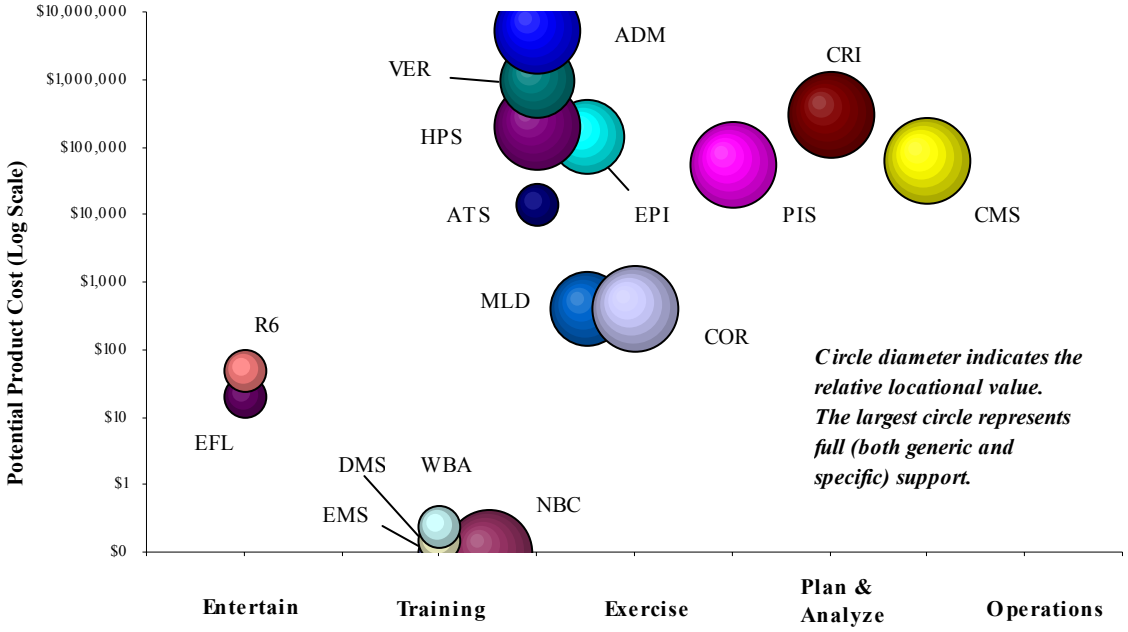


Figure 20. Potential Product Cost vs. Application Cost, by Relative Locational Value

A caveat must be made regarding the validity of comparing the relative costs of the T&E-centered cluster versus the planning/analysis/operations cluster. Reviewed products in this second group could integrate externally sourced, third-party databases or modules, the added costs of which were not identified to the same degree as customization of the former cluster. This framework, however, is not intended to identify explicit relationships between "value" and product attributes, because this varies according to user needs.

Product cost will be a significant factor in the administration of T&E programs, at all levels of government. Total product costs may involve many direct or indirect costs such as: initial acquisition, installation, staff training, customer support, maintenance,

utilities, administration, etc. It is beyond the project scope to identify and quantify all such costs. Instead, our interest in cost focuses on the effect it may have on program planning and training strategy. Efforts will be made in the concluding document to address how fixed and marginal costs of certain product types may influence product selection according to the type of training or exercising.

3. LINK MEDIA WITH T&E CATEGORIES (TASK 4)

Figures in this section were produced using RRP. They show selected RRP capabilities for managing numerous sets of data from multiple sources. With continuous refinement of requirements attributes (people inputs to the cycle) and product attributes (technology inputs to the cycle), the link between the two is achieved. This results in a robust architecture that maintains live documents that "tell the story" of requirements in a logical context, dynamically linked to a database for sort and query capabilities. Because of the dynamic nature of this analysis, these reports represent initial mappings. We are refraining from making any firm conclusions at this time since there are still additional products to evaluate and the requirements continue to be revised and improved.

a. Mapping of Requirements and Products

Once pertinent attributes were chosen,[13] ThoughtLink rated the products to achieve the linkage described above: mapping of products to requirement categories via T&E strategy.

The 3 screen shots below, Figures 21, 22, and 23, demonstrate which product (listed on each row) is mapped to each T&E category (listed as columns). The last letter of the column name corresponds to the name of a T&E requirements category – refer to Table 2 in Section C. The intersection cells marked with an arrow indicate mapping. If the cell is left blank there is no mapping between the two at this point.

For example, in Figures 21 and 22, the Abbottville table top simulation does not map to any of the T&E categories displayed. However, in Figure 23 it does map to category N (Advanced, team training in a generic environment where the user must demonstrate knowledge/skill via decision-making).

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[13] See Appendix A for attributes and their definitions.

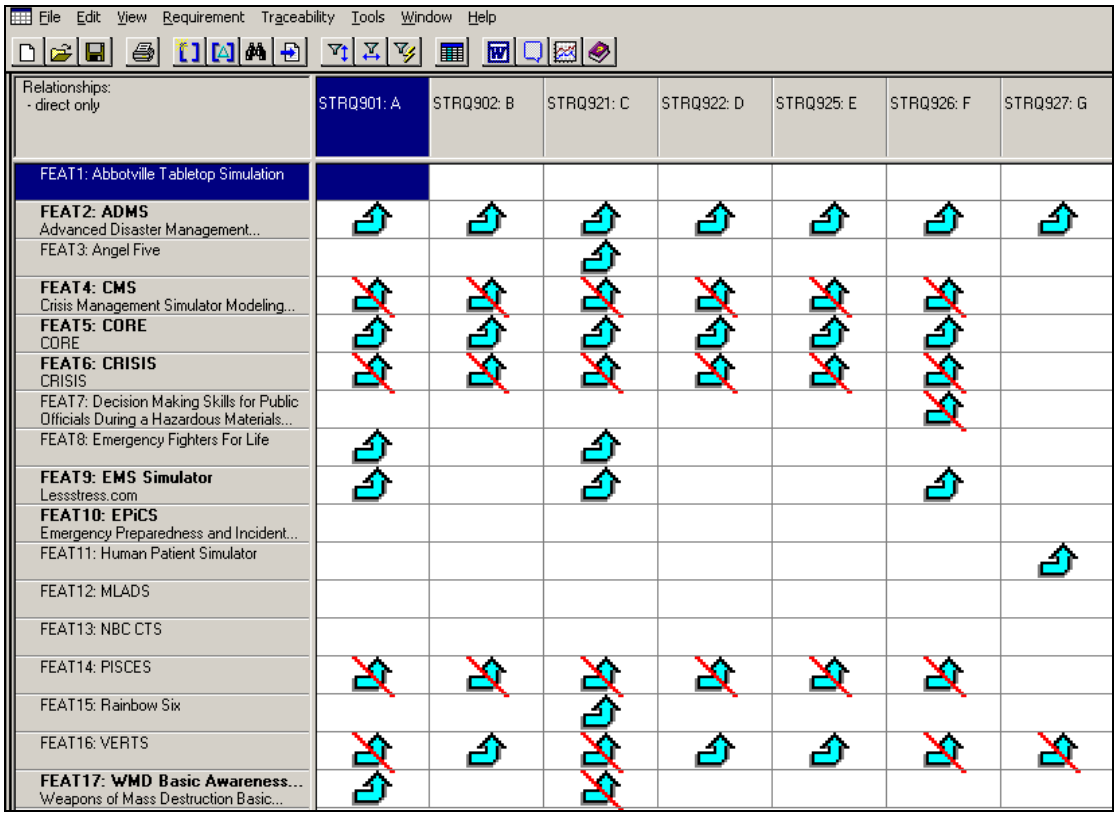

Figure 21. Mapping between Products and T&E Categories A-G

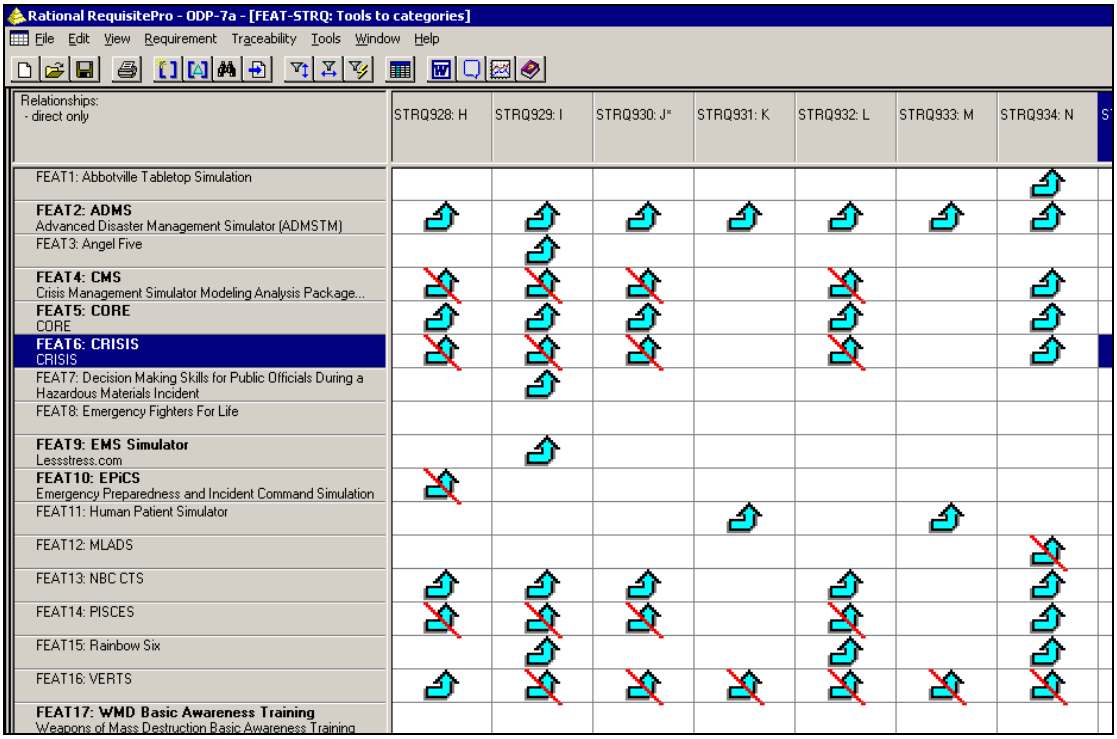

Figure 22. Mapping between Products and T&E Categories H-N

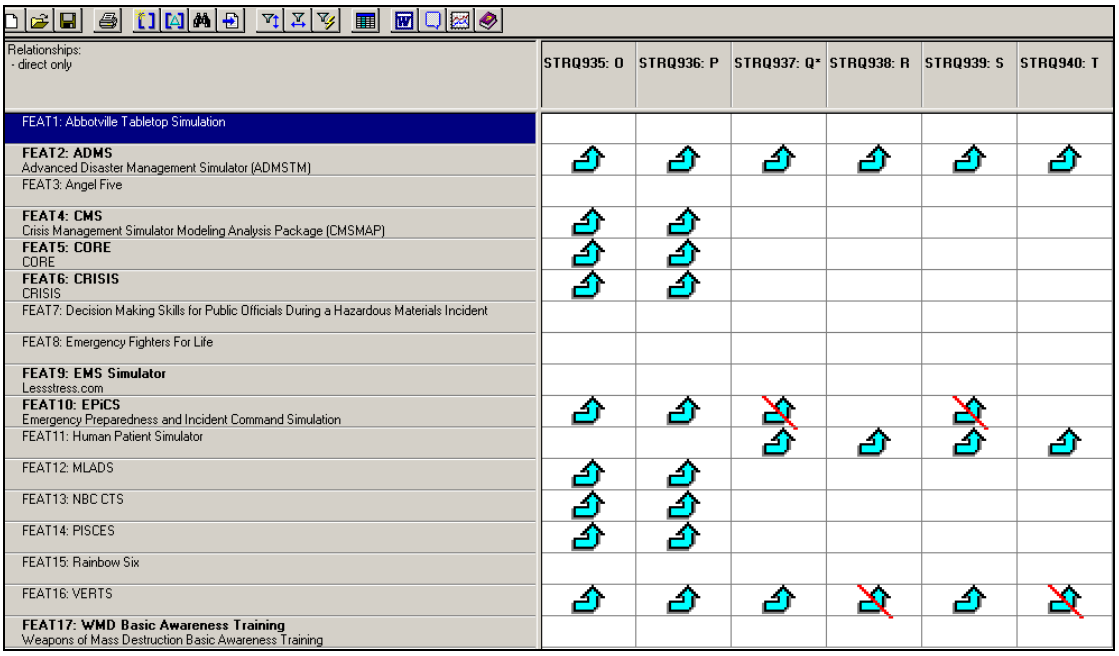

Figure 23. Mapping between Products and T&E Categories O-T

In essence the mapping indicates which MS&G are best suited, based on training strategy, for training/exercising each category of requirements. This is not to say, for example, that a particular tool (e.g., Abbottville) cannot be used to train/exercise requirements other than those listed under package N. The value of this categorization, however, is to provide ODP a recommendation for the best use of the many products available, as this mapping will contribute to the overall T&E system.

The reader will notice that some arrows, indicating mapping, have a red line across them. This indicates which mappings have been marked as suspect and require further analysis. For example, refer to Figure 21 and inspect the tracing between the fourth product listed on the left, CMS, and the first column listed, package A. Although at first glance it appears the product could support that type of T&E, further analysis is needed to determine whether this tool is better suited for this category or not. Reasons for suspect markings include: ThoughtLink is awaiting clarification on a product from the vendor and/or user, and/or the current state of the product could support the mapped training strategy if the product were to be modified/updated, etc.

Also note that one of the two products that maps to every T&E category, ADMS (Advanced Disaster Management System), has no suspect mappings, thus suggesting perfect T&E strategy linking with every category. It is important to note that this is the case because that product contains a suite of media that can be used for different purposes

(e.g., ADMS RTS is a Remote Training Station and ADMS ACT is an Airport Certification Trainer). (The reader will note blue highlighted sections in the screen shots, which denote where the cursor was resting at the time, no other emphasis is intended by this).

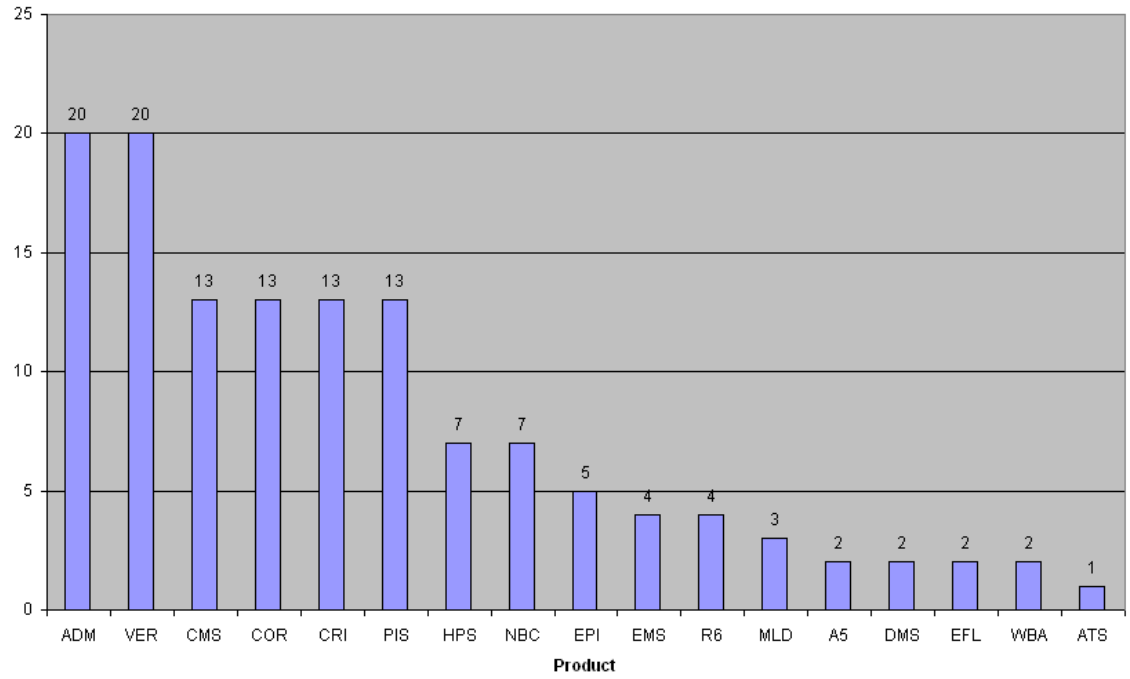

Figure 24. Number of Products Mapped to each T&E Category

Note that each product is matched to at least one T&E category (there are currently a total of 20 T&E packages, A-T). Conversely, every T&E category is supported by at least one product. The breakdown is shown below in Figure 25.

The reader can see that Category C is where most products map into because it contains basic, individual (level) training requirements, to be taught in a generic environment (where the user is to apply the information to demonstrate knowledge/skill acquisition). The second most mapped category is N (Team, advanced, applied, training conducted in a generic environment). This is encouraging because the 17 products evaluated to date span the spectrum of the attributes analyzed from the most basic level to the advanced.

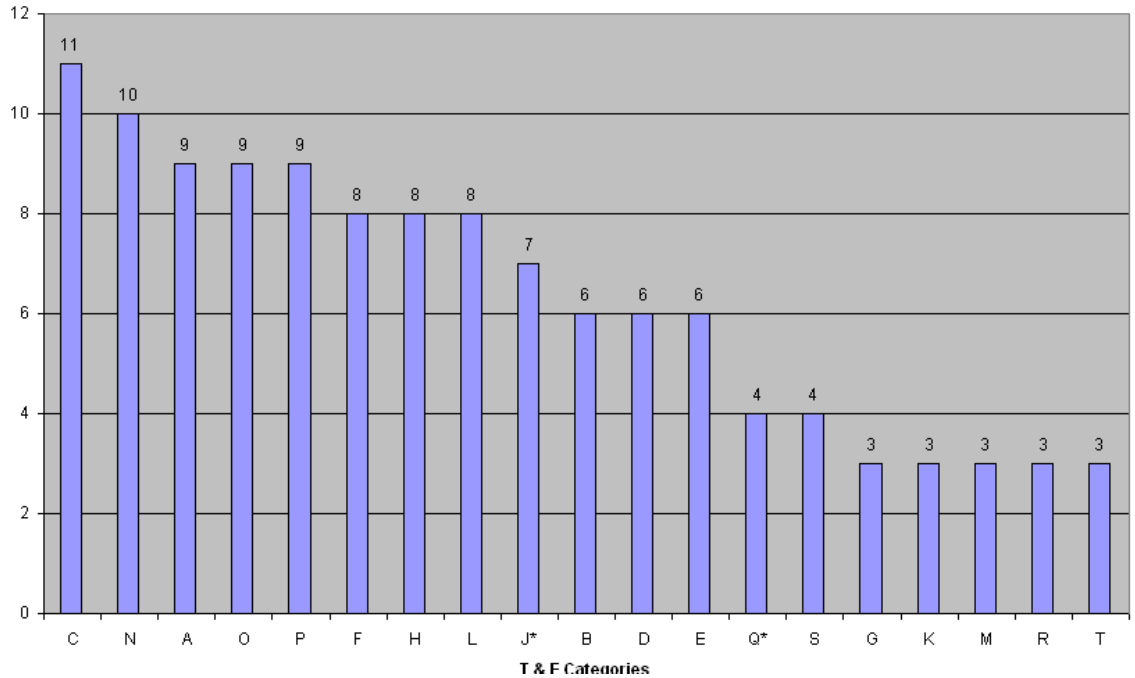

Figure 25. T&E Categories Sorted by Number of Products Mapped

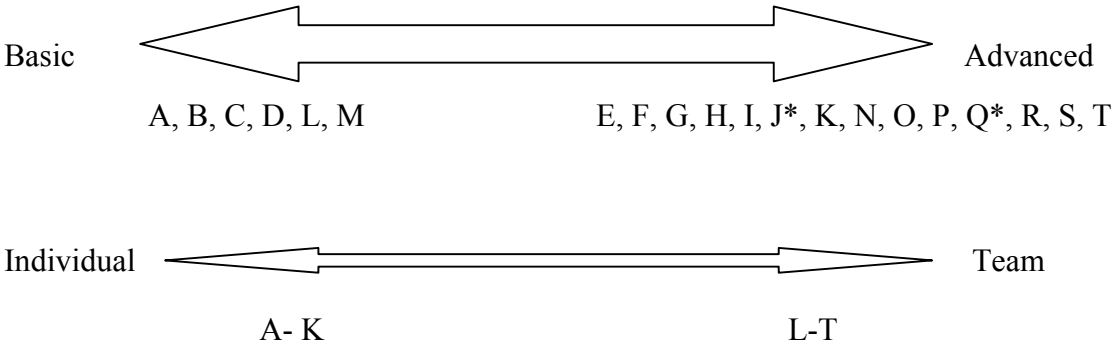

Figure 26. Span of T&E Categories

Also of interest is the fact that exercise requirements (contained in categories J* and Q*, individual and team exercises respectively) can be met by a variety of products. (Asterisks in Figure 26 denote packages containing exercise requirements, the rest contain training requirements; this reflects current RRP organization). These products vary widely in their intended purpose and include a hand held controller/evaluator tool (CORE), a human patient simulator (HPS) that reacts to WMD exposure and treatment as

a human would, and large scale simulators (e.g., CMS, CORE, CRISIS). Different tools will be used for different purposes within the same T&E category.

b. Previous ThoughtLink Observations and Recommendations

In Agrait et al., 2003, ThoughtLink outlined observations of the current T&E program which included observations in the following areas: Best Practices, General, TTX, Functional Exercise, and FSE. In addition, ThoughtLink outlined areas which constituted New Concepts for Improving T&E and introduced areas where MS&G could augment the current program. The observations and new areas for MS&G can be found in Appendix D. ThoughtLink has begun analyzing these areas and attempting to map them to evaluated products. Figure 27 illustrates which of the currently evaluated products can support T&E to accomplish the recommendations. This analysis was performed by assigning evaluative judgments to each of the areas, in accordance with the structured, subjective process described in above.

Further support for our conclusions was provided by extracting requirements from our database that represent those areas (for a complete listing of these extracted requirements see Appendix E). Thus, a link is provided between the tools and ThoughtLink's observations/recommendations (i.e., indicating which of the currently evaluated products can be used to train/exercise those areas). There is also a link between the requirements, which not only came from our observations but from other sources. That is, we not only selected sample requirements from our observations but some that speak to the same issues from other sources (e.g., Titan sample city objectives and the Pelfrey report).

The following screen shot (Figure 27) depicts the mappings from the General Observations to our evaluated products, where all but three of the tools (Angel 5, Emergency: Fighters for Life and WMD Basic Awareness Training Interactive CD) address these areas. As previously indicated a red line over the tracing arrow indicates the trace is "suspect" and further analysis is needed and/or we are awaiting product update information from the manufacturer to determine whether this is in fact, a perfect fit or if the mapping is not well suited after all. For the time being suspect tracings were presented because, for the most part, they are believed to turn into solid mappings.

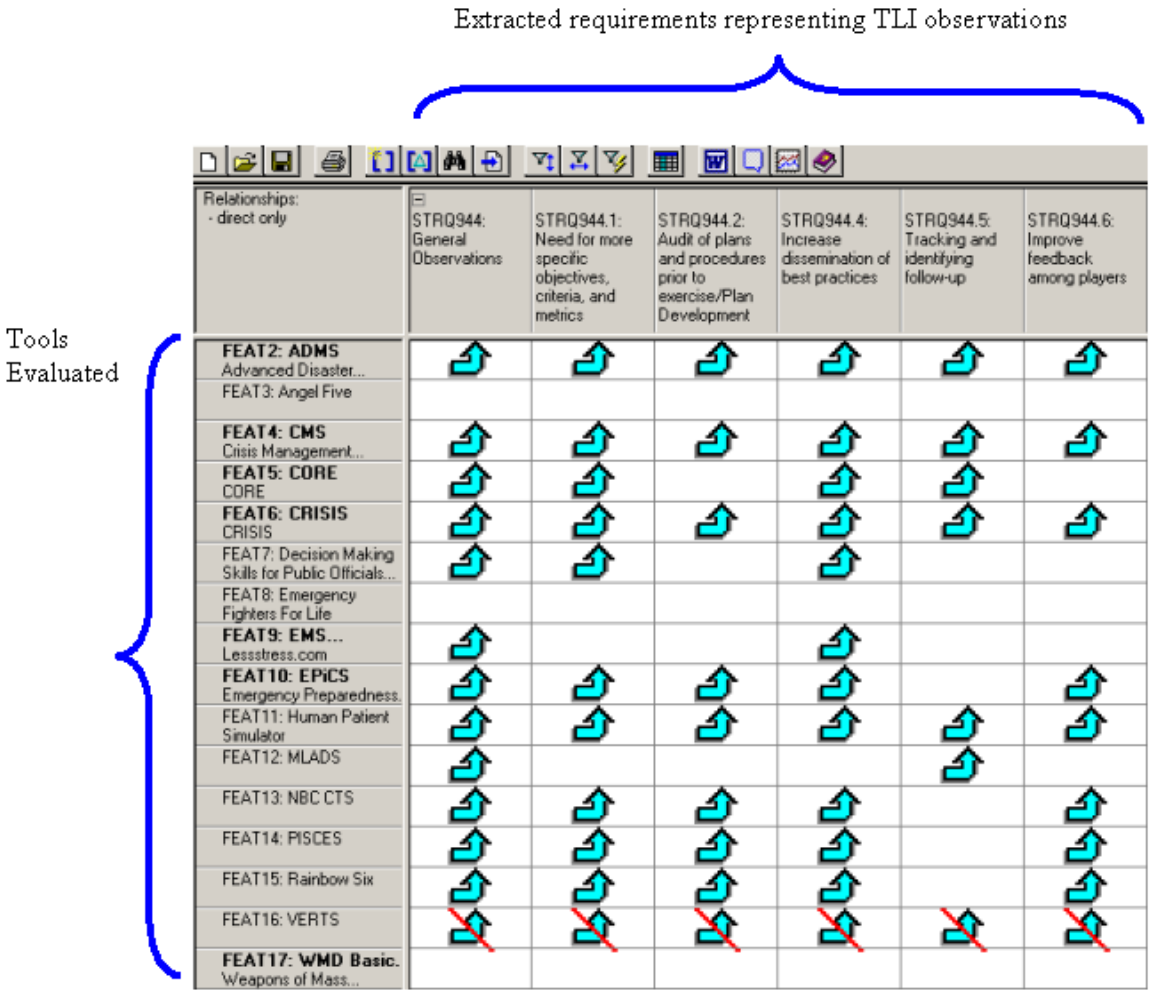

Figure 27. Mappings from ThoughtLink General Observations to Products Evaluated

The following are examples of requirements that characterized our observed General Observations/Recommendations along with a listing of the tools that support them, i.e., we have extracted requirements from our database that represent some of the observations ThoughtLink has made and have mapped those to our currently evaluated tools.

Key

Requirements	Specific Observation/Recommendation	Location	Traced-from
unique requirement number contained in our database		Document it originated from	Product that can be used to T/E where an (s) indicates a suspect trace

Sample General Observations/Recommendations Requirement:

Requirements	Specific Observation/Recommendation	Location	Traced-from
STRQ111: Risk analysis and preplanning **Know how to conduct risk analysis and assessments for hazardous materials and WMD agents and materials for on-scene situations and for preplanning potential terrorist targets in the local community**	Audit and evaluate plans and procedures prior to an exercise/Plan development	ERG**	ADM EPI VER

Note: See Table 3 in Section E.1 for product abbreviations.

The next screen shot (Figure 28) depicts the mapping of products to our selected TTX observation areas. All but one of the evaluated products (WMD Basic Awareness Training Interactive CD), which is designed to train basic awareness, can support our recommendations for table top exercises.

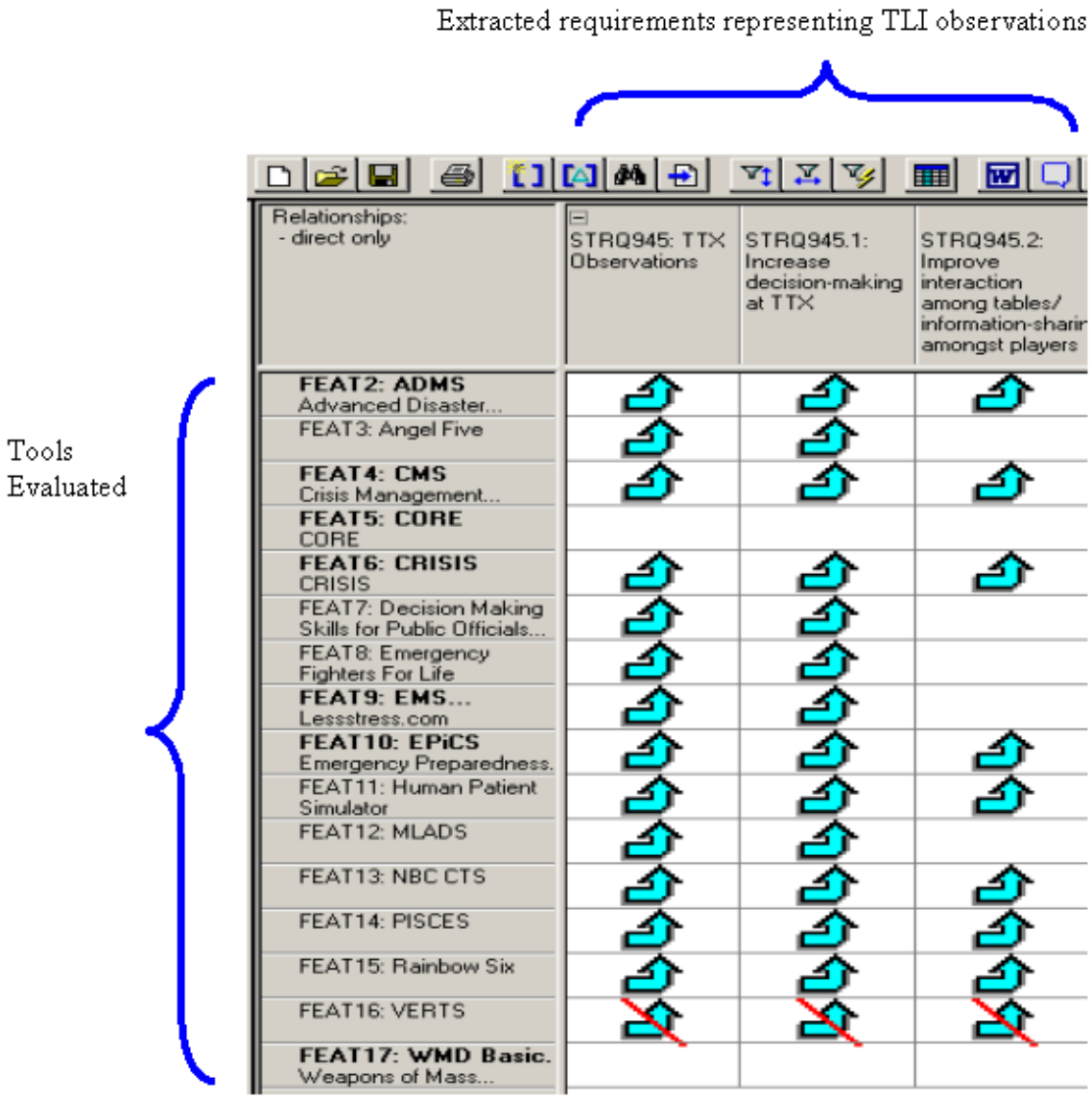

Figure 28. Mappings from ThoughtLink TTX Observations to Products Evaluated

A sample requirement corresponding to our TTX observations follows:

Key

Requirements	**Specific Observation/Recommendation**	**Location**	**Traced-from**
Unique requirement number contained in our database		Document it originated from	Product that can be used to T/E where an (s) indicates a suspect trace

STRQ414: Information sharing. **Assure vital information about the incident is effectively shared with all agencies**	Tracking interactions/info-sharing among players	Pelfrey Part II	ATS ADM CMS COR CRI EPI MLD PIS

Note: See Table 3 in Section E.1 for product abbreviations.

This screen (Figure 29) indicates mappings to a selected recommendation from observing two functional exercises and from our FSE observations. Once again, as depicted by the arrow tracings, all areas have been mapped by many different products. This is important because, as previously discussed in section E.2 these products range from single user entertainment-oriented games to large-scale multi-user complex simulations. As ThoughtLink continues identifying and evaluating products, these categories will expand to accommodate other media meeting ODP T&E objectives.

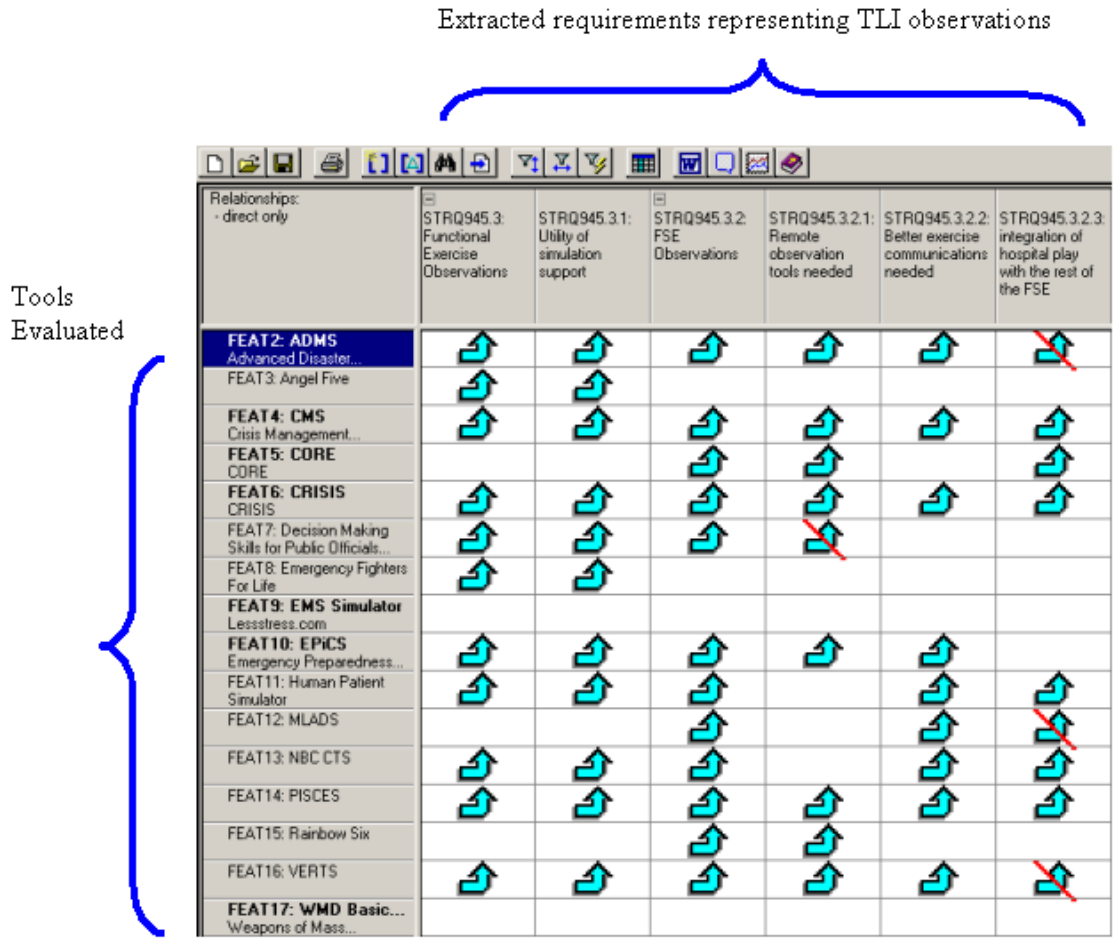

Figure 29. Mappings from ThoughtLink FE and FSE Observations to Products Evaluated

A sample requirement representing these areas is:

Key

Requirements	Specific Observation/Recommendation	Location	Traced-from
unique requirement number contained in our database		Document it originated from	Product that can be used to T/E where an (s) indicates a suspect trace

STRQ644: Simulation training before the FSE. simulation-supported training should be performed between the TTX's and FSE	Simulation support	BWTTX Orlando	ATS ADM A5 CMS CRI HPS NBC PIS R6 VER

Note: See Table 3 in Section E.1 for product abbreviations.

Finally, ThoughtLink has identified new areas to complement and improve the current T&E program where MS&G can fill a niche,[14] as depicted by the screen shot below:

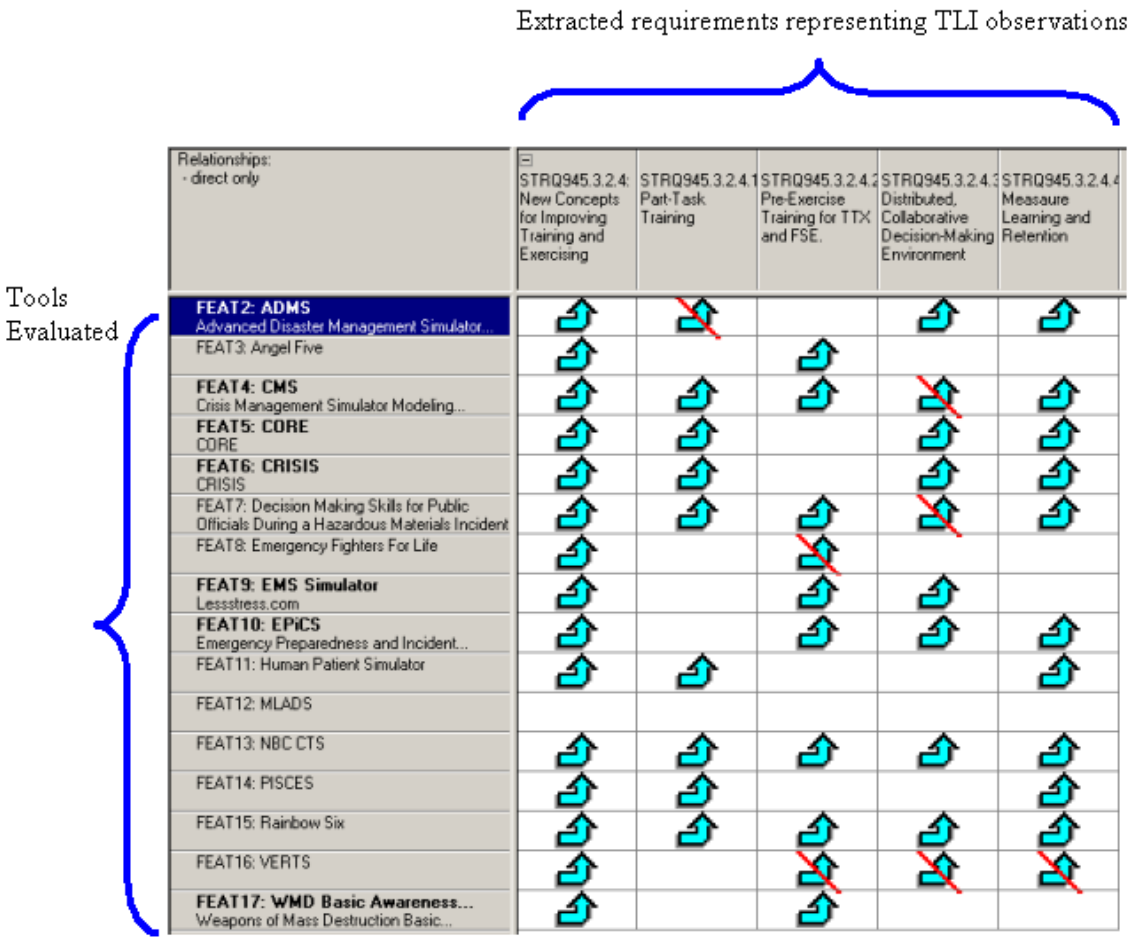

Figure 30. Mappings from ThoughtLink New Area Observations to Products Evaluated

14 See Agrait et al., 2003 for full discussion of these new areas.

This last table depicts selected sample requirements for the new niches for MS&Gs:

KEY

Requirements	Specific Observation/Recommendation	Location	Traced-from
unique requirement number contained in our database		Document it originated from	Product that can be used to T/E where an (s) indicates a suspect trace

STRQ55: Hazard/risk analysis demonstration Demonstrate skill and knowledge in preparing hazard and risk analysis of potential WMD targets in the local community.	Measure of learning/retention & Transfer of Learning	ERG	ATS (s) CMS CRI EPI NBC(s) PIS VER
STRQ645: Individual department training prior to TTX. training/exercising for each group, separately, prior to a TTX. This would be easier to setup and accomplish. It would get each group up to speed before they work together, and thus should improve the effectiveness of the TTX. The potential benefits would include easier to setup, easier to arrange, easier to conduct, and training/exercising efficiency.	Pre-training	BWTTX Orlando	ATS ADM COR CRI DMS HPS NBC PIS VER (s) WBA
STRQ666: Collaborative effort training	Distributed, collaborative, decision-making environment	CWFSE Las Vegas	ATS ADM CMS CRI EPI HPS MLD NBC PIS VER

Note: See Table 3 in Section E.1 for product abbreviations.

Overall the mappings are encouraging, given the match between T&E categories and product features, and they provide support for the use of MS&G. This indicates that there are existing tools that can expand ODP's choice for meeting the response and decision-maker community's needs. Although MS&G will not completely replace face-to-face training and exercises they can be used to address some of the same T&E objectives with the same degree of success as parts of the existing curriculum do. Once we complete all our rounds of evaluations we will be able to provide curricula recommendations and further delineate the most appropriate products for each area.

c. Future Reporting Capabilities and Database Refinements

Reports provided in this document represent a sample of RRP capabilities for managing numerous sets of data from multiple sources. With continuous refinement of requirements attributes (people inputs to the cycle) and product attributes (technology inputs to the cycle) the link between the two is achieved. This results in a robust architecture that maintains live documents that "tell the story" of requirements in a logical context, dynamically linked to a database for sort and query capabilities. In anticipation of adding greater functionality to this architecture, we describe some of the future enhancements to our database and analysis capability.

1. Prevention Tasks

ThoughtLink has learned of an effort to establish prevention tasks for the ODP T&E Community. These tasks, currently in draft form, have begun to be imported into our database. It is our understanding that each task will have a time indication representing where this task falls in the prevention/response continuum. And that in addition, evaluation criteria (performance measures) are being developed. Specification of evaluation matrices for these behavioral items would further our product analysis. When these tasks are completed and imported in RRP it is expected that a link can be made between such tasks and other T&E tasks thus establishing these prevention tasks as prerequisites for training and exercising and also establishing a link to performance measurement. That is to say that prevention tasks can point to a T&E need, which can be linked to current curricula and recommended for MS&G. The following screen shots illustrate this process where, on the left hand side of the screen shot, the small arrows underneath requirements depict tracings between requirements. For example, the prevention task (requirement STRQ 8227: Know and recognize types of agents) is traced to the highlighted training requirement (STRQ 106: Recognize WMD). The text box highlighted on the right shows the associated attributes (e.g., ratings on responder levels, source document, etc.) of the requirement.

Figure 31. Sample Prevention Task Requirement Details

2. Attribute Refinements

Although the distinction between group and individual training has been made for the evaluated products, our database does not currently reflect this distinction in the requirements imported. The idea behind these attributes is that individuals can participate in interactive content as a group member, and then gain from the shared experience of the activity. This is likely to be parsed out in future rounds of analysis and thus these categories will no longer be considered together (i.e., individual requirements will be separated from group requirements). That is to say, there will likely be more attributes included in the analysis allowing for tighter mappings - which translate to more definitive recommendations for most appropriate use of MS&Gs. Likewise, future iterations of requirement analysis will include the distinction between small and large teams, as has been done for the tools in this round of evaluations. Stress (High, Low), Training Process Context Approach (Demonstration, Discussion, Trial and Error, etc.), Location (Class, Lab, Field), etc.

3. Refining Established Categories

As new attributes are considered in our analysis existing T&E categories are likely to need refinements and new categories may be created. For example, thereOther attribute might be considered for inclusion include: WMD Competency Levels (Awareness, Performance, Technician), Learning/Training Types (Intellectual Skills, Verbal Information, Cognitive Strategies, Motor Skills, Attitudes, Integrated Types), Feedback (Immediate, Delayed, etc.), is currently no category for intermediate requirements (i.e. student level between basic and advanced). As new requirements are identified the creation of such a category may become necessary.

4. Input Characteristics

Related to the prevention tasks, mentioned above, are input characteristics. These are training and exercise requirements that the user should possess before participating in a particular situation (e.g., prerequisites). These requirements have been imported into our database from the various sources (as indicated under "Location" in the screen shot below).[15] We found these tasks did not necessarily indicate tasks that should be trained or exercised, but instead indicate levels of proficiency. Just as one would need to meet

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[15] Please note the full requirement statements are not displayed, only the name, or abbreviated version is shown here.

certain minimum qualifications to be hired to a position or to receive a promotion, ideally, every job category would indicate minimum levels of proficiency to hold the job effectively. The following screen shot depicts some of the input characteristics imported to our database to date. Unfortunately, our source documents do not specify the corresponding requirements or job levels.

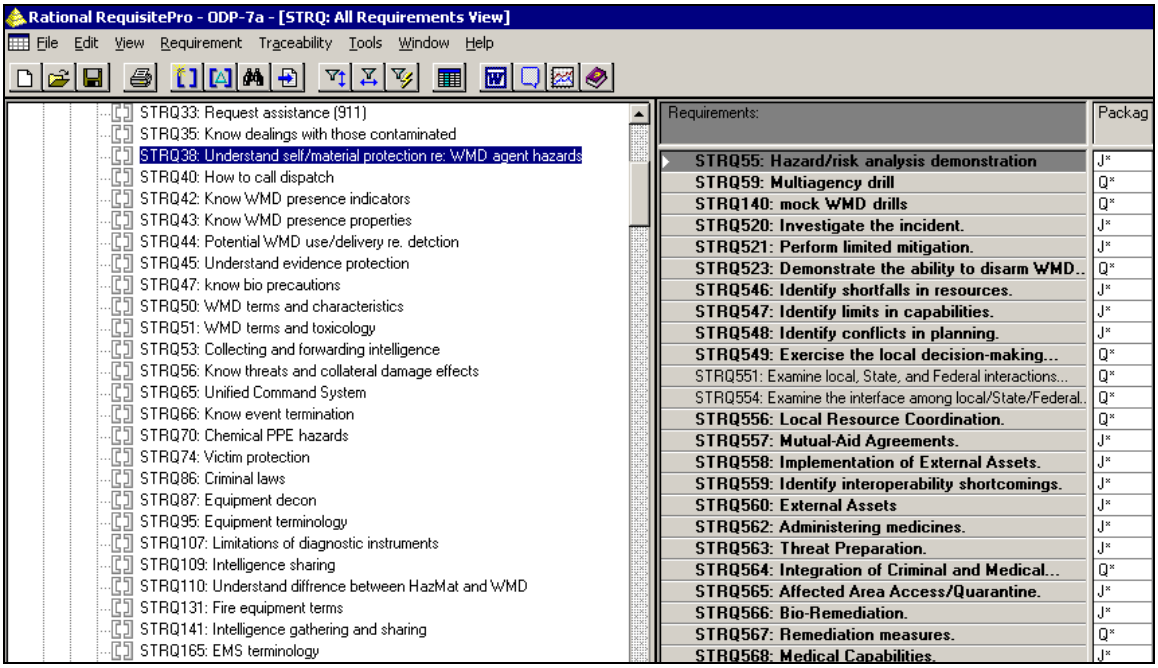
Requirements:	T/E	Location	Package
STRQ614: Ability to recognize WMD signs.	Exercise	SHEEP	J*
STRQ615: WMD caused firefighting.	Exercise	SHEEP	Q*
STRQ616: PPE.	Exercise	SHEEP	J*
STRQ618: Medical receiving notification.	Training	Chattanooga	A
STRQ619: back up to the 911-center and stand by of the mobile...	Training	Chattanooga	Other Training
STRQ620: Knowledge of common terminology	Training	Chattanooga	A
STRQ621: Uniform patient classification.	Training	Chattanooga	A
STRQ622: Rumor control and public information updates	Training	Chattanooga	
STRQ623: Back up victim communication system	Training	CWFSE Glend	Other Training
STRQ624: Public and private sectior interaction	Training	CWFSE Glend	Other Training
STRQ625: Hazmat to monitor their radios	Training	CWFSE Glend	C
STRQ626: Coroner communication	Training	CWFSE Glend	Sources
STRQ627: Victim identification.	Training	CWFSE Glend	B
STRQ628: Role clarification	Training	CWFSE Gran	B
STRQ629: Develop clear incident-objectives.	Training	CWFSE Gran	I
STRQ630: Positive confirmation of information received	Training	CWFSE Gran	A
STRQ631: monitor air quality at the scene	Training	CWFSE Gran	K
STRQ632: Testing for agents at multiple points.	Training	CWFSE Gran	K

One source document, Pelfrey et al., 2001, attempts this in the way the job levels are classified. For example, Law Enforcement Awareness level tasks "addresses training requirements for law enforcement personnel who are likely to witness or discover an event involving the terrorist/criminal use of weapons of mass destruction or who may be sent out to initially investigate the report of such an event…." Tasks listed here represent the most basic level of performance for a Law Enforcement Officer. The next level, Performance Level, is divided into two categories where "…It is expected that those officers trained for Performance Level A will work in the warm zone and cold zone and support those officers working in the hot zone. Officers trained for Performance Level B will work in the hot zone, and in the other zones set up on the incident scene as needed." Furthermore, the report lists the training prerequisites for this job level, "Have successfully completed adequate and proper training at the awareness level for events involving hazardous materials, and for WMD and other specialized training…."

The problem, as is often the case, is that there are a multitude of sources and classifications vary. Often input characteristics are not specified. As ThoughtLink uncovers more input characteristics, as we add new requirements source documents to our database, and if input characteristics are specified, we will be able to provide linkages to other T&E requirements. RRP will facilitate this mission, as we are able to maintain traces back to source documents and to identify "missing links," for example, pointing out which requirements are not tied to preceding requirements.

5. Linking Exercise and Training Requirements

As mentioned in Section C, Requirement Extraction Categorization, some requirements are identified as training requirements and some identified as exercise requirements (packages J* and Q*). Though there is great overlap in these requirements some exercise requirements are clearly stated in a way that accomplishment of the task would be the demonstration of a skill or ability. Refer to the following screen shot for an example:

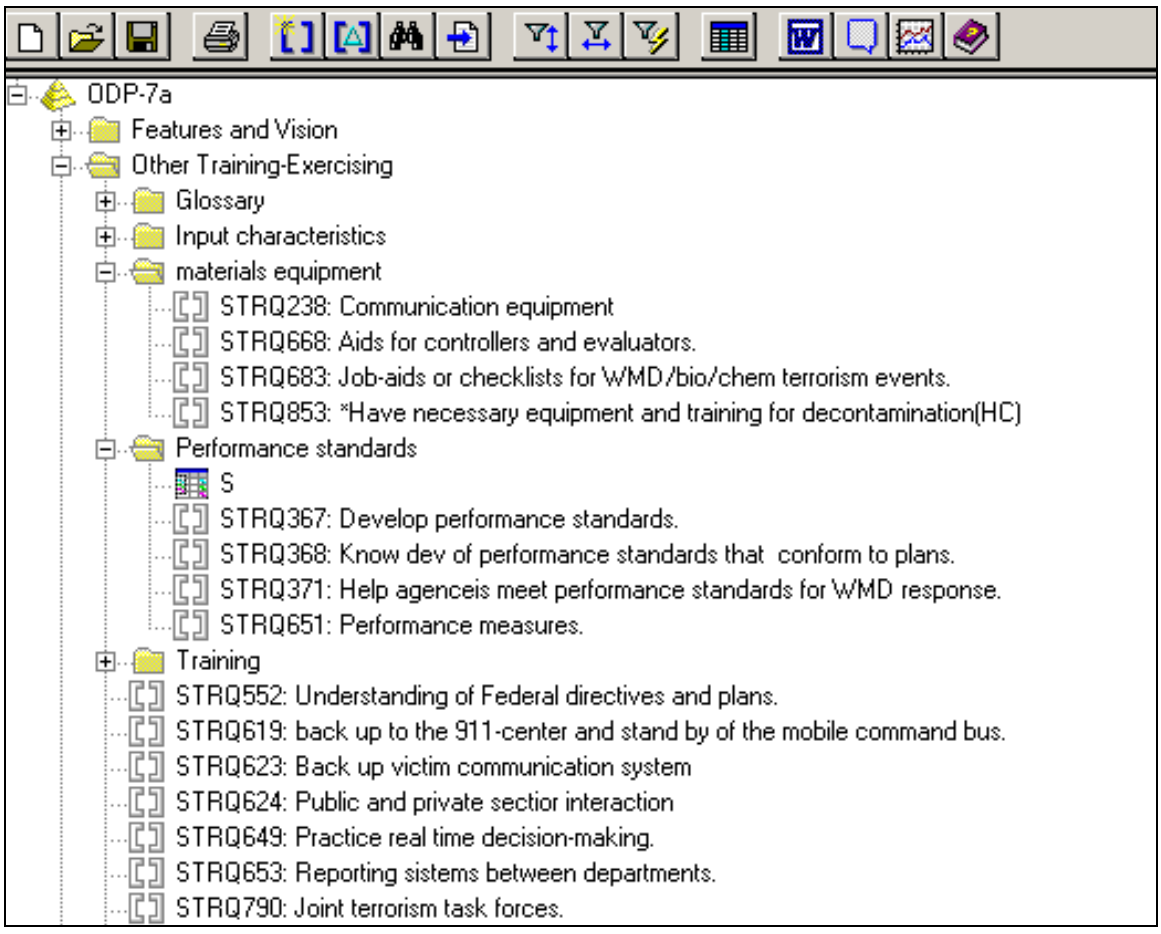


The column on the left displays some of the training requirements contained in the database. The view on the right displays all exercise requirements. A link could be established on the highlighted requirements so that the highlighted training requirement on the left (STRQ33: Understand the hazards and risks to individuals and property

associated with WMD agents and hazardous materials) could serve as an input characteristic, or pre-requisite, for the exercise requirement highlighted on the right (STRQ 55: Demonstrate skill and knowledge in preparing hazard and risk analysis of potential WMD targets in the local community). These requirements serve as indices for prescriptive exercising (where only exercises that match ones' identified skill and knowledge base are offered to him or her, with the goal of making the exercise experience more meaningful, efficient, and cost-effective).

6. Other T&E Requirements

There are a few miscellaneous supporting requirements that point to things such as materials/equipment needed to perform tasks, performance standards development, and other training topics, such as establishing terrorism task forces. A sample screen shot is shown below. These also represent possible future linkages as our database expands.



Through the use of RRP, ThoughtLink will continue the process of knowledge management, where we capture, organize, and store information and experiences within the WMD arena from a variety of sources, internal and external to ODP, as we progress into the next phase of our project. By collecting those artifacts in a central or distributed electronic environment (in this case, a database), we will continue to aim to enhance ODP's T&E program.

F. PRODUCT SUMMARIES

This section contains short descriptions of the 17 products reviewed in the first phase of this review. Each product description includes company contact information, key product attributes, and a brief description of the product. For the interested reader, detailed product reviews are found on the CD accompanying this report.

Product Name: Abbottville Tabletop Simulation

Company:	**Contact Information:**
Command School	Scott Porman
117 South West End Ave.	866-238-6688
Lancaster, PA 17603	scott@commandschool.com
Web Site: www.commandschool.com	

Key Product Attributes:

GOTS/COTS: COTS	**Training Type It Supports:** Part-task Training, Pre-Training, Tabletops, Full Scale Exercise Reinforcement
Application Area: Exercise	**Functional Area(s) It Supports:** EMS, EMA, Fire, Government Administration, HazMat, Law Enforcement, Public Health, Healthcare, Public Safety Communications and Public Works
Media Scale: Small Multi-User Team	**Primary Target Audience:** First Responders, Commanders, Local Officials, State Officials, and Federal Officials
Product Type: Board Game Simulation	

Product Description: Abbottville Tabletop Simulation is a three-dimensional physical model of a generic city consisting of over 400 buildings ranging from suburban, rural, industrial, urban, to high rise buildings or special hazards with simulated sound effects. The tabletop is led by an instructor or facilitator from the Command School. The model is used to support tabletop exercises that can be adapted for the needs of local officials.

There are three main versions available; a city diorama, mall diorama (12' x 9' mall and surrounding strip mall) and an Emergency Operations Center (EOC) using an Incident Command System (ICS) and stations for each area of ICS/EOC. Aspects that can be used in the model include: airports, chemical companies, a zoo, a high school, and a carnival. Real fire and smoke can be used, emergency equipment is dispatched and simulated via the use of scale model apparatus, police cars, and ambulances positioned on the board. Emergency personnel are identified by wearing vests. The instructor controls background sounds of fire, sirens, wind and portrays people (e.g., agitated victims) which set the scene.

Actual incidents are used as the basis for 85% of the scenarios. Scenarios include personal injury accidents, structural fires, chemical releases, terrorist acts, tornados, earthquakes, floods, and airplane and train accidents. Scenarios can run as short as 40 minutes and as long as 8 hours.

Observations: Can be used to audit and evaluate plans, increase decision making skills, provides simulation support to tabletop exercises, and can be used to practice communication

Version: N/A – versions are referred by title and diorama type

Date Evaluated: February 25, 2003

Product Name: Advanced Disaster Management System (ADMS)

Company:	**Contact Information:**
Environmental Tectonics Corporation (ETC) 12001 Science Drive, Suite 180 Orlando, FL 32826 **Web Site**: www.adms.info	Mr. Shabbir Merchant, President, Simulation Division 407-282-3378 Fax: 407-282- 3583 info@etcflorida.com

Key Product Attributes:

GOTS/COTS: COTS **Application Area:** Training and Exercise **Media Scale:** Individual, Group, and Small and Large Multi-User Teams **Product Type:** Virtual Computer Simulation	**Training Type It Supports:** Equipment Training, Tabletops, Functional Exercise, and possibly Awareness, Part Task Training, Drills, and Distributed Collaborative **Functional Area(s) It Supports:** EMS, EMA, Fire, Government Administration, HazMat, Law Enforcement, Public Health, and Public Works **Primary Target Audience:** First Responders and Commanders, and possibly Local Officials, State Officials, and Federal Officials

Product Description: ADMS™ is a computer simulation that can be purchased as software or as a bundled system of hardware and software. It is primarily a software-oriented system and is not dependent on specific hardware. The system is geared toward training and evaluation of emergency personnel, their procedures, and support infrastructure. The core technology was originally developed to measure and evaluate the level of competency of fire fighters when faced with a stressful disaster event. This product allows for pre-scripted training and any modifications desired to adapt the system to specific localities. The system is modular and can be configured to support multiple types of use; testing emergency plans, developing alternative tactics for operational processes. One module simulates an emergency vehicle for training purposes.

The simulation models are physics based and represent reality. Simulation models are validated through industry standards and real world physics. Weather modeling capabilities include snow, rain, fog, fire, and smoke. It can incorporate existing simulation models (e.g., Cameo) and/or real time weather and other parameters (e.g., passenger manifesto data). It is designed to run programs either in an instructor-controlled environment, or in an instructor-less mode.

Observations: Uses specific metrics, can be used to audit plans, disseminates best practices, tracks participant performance, provides structured feedback among players, can increase decision making skills, can track interactions among participants, provides simulation support, provides remote observation, can be used to practice communication, provides a distributed collaborative decision making environment, and it can measure learning.

Version: N/A (earlier versions of the product had different names)

Date Evaluated: 3/25/2003

Product Name: Angel Five

Company:	**Contact Information:**
Visual Purple, LLC Mr. John W. Jarrett Vice President, Product Development Visual Purple, LLC 805-595-7579 x116 jjarrett@visualpurple.com **Web Site**: www.visualpurple.com.	At this time, not available for use outside the FBI. Walt Mesler, Contracts Office 703-814-4900

Key Product Attributes:

GOTS/COTS: GOTS **Application Area:** Training and Exercise **Media Scale:** Individual and Group **Product Type:** Interactive Computer Based Training	**Training Type It Supports:** Pre-Training, Drills, and Tabletops **Functional Area(s) It Supports:** Law Enforcement **Primary Target Audience:** Federal Officials

Product Description: Angel Five is a PC-based crisis management training and response tool that can be used as an individual trainer and in a table-top exercise forum. The purpose of the product is to teach FBI Special Agents in Charge and Assistant Special Agents in Charge how to manage the FBI response to a WMD radiological event. It is a 3rd person interactive role-playing simulation; the user role plays a special agent in charge in a Midwestern city. The story develops based on a) user decisions and b) 158 parameters chosen randomly in each new simulation execution.

The simulation appears as a series of video clips, showing the current situation, followed by a decision point for the user, with 3-9 possible choices given. The user picks one, which then determines the next set of video clips to show and in turn, the next set of possible actions/decisions. This is a multi-path, interactive video simulation using live actors and on-location, Hollywood-style filming techniques. Environments are either actual locations (FBI offices) or faithful representations of the same. Interactions are realistic and based on current procedures and protocols.

Angel Five contains video surveillance, Intelligence Summary Board, and other typical FBI crisis management aids. The user can access simulated communication modes like FAX and email; their use is integrated into decision-making. A large reference library is incorporated into the product.

Observations: Can be used to increase decision making skills and provides simulation support

Version: N/A

Date Evaluated: February 25, 2003

Product Name: Crises Management System Modeling Analysis Package(CMS MAP)

Company:	**Contact Information:**
Applied Science Associates Eoin Howlett, General Director 401-789-6224 Ext. 18 ehowlett@appsci.com	Chris Galagan, Project Manager 401-789-6224 Ext. 30 chris@appsci.com

Key Product Attributes:

GOTS/COTS: COTS **Application Area:** Training, Exercise, Operational, and Analysis **Media Scale:** Small and Large Multi-User Teams, possible Individual and Group **Product Type:** Human Controlled Computer Simulation	**Training Type It Supports:** Drills, Tabletops, Functional Exercises, Full Scale Exercises, Full Scale Exercise Reinforcement, National Training Exercises and possibly Equipment Training, Awareness, Part-Task Training, and Pre-Training **Functional Area(s) It Supports:** EMS, EMA, Fire, Government Administration, HazMat, Law Enforcement, Public Health, and Public Works, Healthcare, and Public Safety Communications **Primary Target Audience:** Commanders, Local Officials, State Officials, Federal Officials, and possibly First Responders

Product Description: CMS is a multi-functional application used to simulate a team's response to an emergency situation. It is primarily oriented toward oil spill and chemical/hazardous-material release types of incidents in a port area. It can be used to simulate oil spills, chemical spills, search & rescue operations, nuclear fall-out, and marine emergencies. CMS enables a team to provide coordinate location, purchasing, and deployment of task forces and resources at any level of the incident/emergency situation.

CMS can be and is used operationally; it has rapid prediction models which assist the response team in understanding the likely direction and impact of a pollutant during the incident. The user may track deployed equipment, personnel, and other resources. This allows cooperative action and communication from any number of emergency service providers

Observations: Uses specific metrics, can be used to audit plans, disseminates best practices, tracks participant performance, provides structured feedback among players, can increase decision making skills, can track interactions among participants, provides simulation support, provides remote observation, can be used to practice communication, can focus on hospital training and exercise, and it can measure learning.

Version: Version 4.4

Date Evaluated: March 31, 2003

Product Name: Competency Observation Recording & Evaluation (CORE)

Company:	**Contact Information:**
Naval Air Warfare Center, Training Division	Rosemary Garris
12350 Research Parkway	Code 4691
Orlando, FL 32826-3275	407-380-4833
	Rosemary.garris@navy.mil

Key Product Attributes:

GOTS/COTS: GOTS software COTS hardware **Application Area:** Training and Exercise, possibly Operational and Analysis **Media Scale:** Individual, Small Multi-User and Large Multi-User Teams, and possibly Groups **Product Type:** Controller and Evaluator Tool	**Training Type It Supports:** Drills, Functional Exercise, Full Scale Exercise, Full Scale Exercise Reinforcement, National Training Exercise, Possibly Equipment Training, Awareness, and Part-task Training **Functional Area(s) It Supports:** EMS, EMA, Fire, Government Administration, HazMat, Law Enforcement, Public Health, and Public Works, Healthcare, and Public Safety Communications **Primary Target Audience:** First Responders, Commanders, Local Officials, State Officials, and Federal Officials

Product Description: CORE is a hand-held device used for remote exercise control, status monitoring, and data entry. It is intended for use by instructors and exercise staff (controllers, evaluators, facilitators, and observers) who are located remotely from the training/exercise control station (e.g., located among students/participants in the field of a large-scale exercise). It can communicate wirelessly with exercise control, or provide data via a docking station after conclusion of the exercise. CORE software is being developed by the Navy (GOTS); the hardware is COTS (primarily a PDA, interfacing with a PC).

It is intended as an instructor and exercise-staff tool to support real-time full-scale exercises. The wireless hand-held device can cue evaluators, provide status information, enable remote control of scenario, collect/record performance data, and transfer data to the exercise/analysis computer for the AAR and subsequent analysis.

Observations: Uses specific metrics, disseminates best practices, tracks participant performance, provides remote observation, can focus on hospital training and exercise, and uses a distributed collaborative decision making environment, and it can measure learning.

Version: N/A

Date Evaluated: April 1, 2003

Product Name: CRISIS

Company:	**Contact Information:**
Ship Analytics Inc. 183 Providence – New London Turnpike North Stonington, CT 06359 **Web Site**: www.shipanalytics.com	Michael Collins, Chief of Development 860-535-3092 Fax: 860-535-0560 mcollins@shipanalytics.com

Key Product Attributes:

GOTS/COTS: COTS **Application Area:** Training, Exercise, Operational, and Analysis **Media Scale:** Small Multi-User and Large Multi-User Teams, and possibly, Individuals and Groups **Product Type:** Human Controlled Computer Simulation	**Training Type It Supports:** Drills, Tabletops, Functional Exercises, Full Scale Exercises, Full Scale Exercise Reinforcement, National Training Exercise, and possibly Equipment training, Awareness, Part-Task Training, and Pre-Training, Distributed Collaborative **Functional Area(s) It Supports:** EMS, EMA, Fire, Government Administration, HazMat, Law Enforcement, Public Health, Public Works, Healthcare, and Public Safety Communications **Primary Target Audience:** Commanders, Local Officials, State Officials, Federal Officials, and possibly first responders

Product Description: CRISIS™ is a large scale system simulation designed to support a full EOC team in responding to and managing incident response for applications ranging from oil spill, storm, and natural disaster, to police counter-terrorism. It has a Command Center training focus.

CRISIS™ can be used in the development of response plans, alternative strategies, and performance measurement scoring of trainee performance to assure a state of readiness. It has predictive models including nuclear and chemical release coupled with countermeasure simulations which allow the evaluation of alternative countermeasures dynamically against the spread of a particular crisis and its impact in terms of economic and biologic damage.

Observations: Uses specific metrics, can be used to audit plans, disseminates best practices, tracks participant performance, provides structured feedback among players, can increase decision making skills, can track interactions among participants, provides simulation support, provides remote observation, can be used to practice communication, can focus on hospital training and exercise, provides a distributed collaborative decision making environment, and it can measure learning

Version: Version 5.3

Date Evaluated: February 24, 2003

Product Name: Decision Making Skills for Public Officials During a Hazardous Material Incident

Company:	**Contact Information:**
Carley Corporation for FEMA	Nancy Kaufman, Project Manager
6023 Selwood Place	6023 Selwood Place
Springfield, VA 22152	Springfield, VA 22152
Web Site: www.carleycorp.com.	nkaufman@carleycorp.com

Key Product Attributes:

GOTS/COTS: GOTS	**Training Type It Supports:** Awareness, Part-Task Training, and Pre-Training
Application Area: Training	**Functional Area(s) It Supports:** EMS, EMA, Fire, Government Administration, HazMat, Law Enforcement, Public Health, and Public Works
Media Scale: Individual and Group	**Primary Target Audience:** Commanders and Local Officials
Product Type: Interactive Computer Based Training	

Product Description: "Decision Making Skills for Public Officials During a Hazardous Materials Incident" is a CD-ROM computer based training (CBT) product. The 6-disk set is aimed at educating Public Officials about making decisions during a HazMat incident using the same information they would have available in an actual incident. The training is designed with audio and video clips to increase the interactive quality of the experience. It was developed by the Carley Corporation through a contract with the Emergency Management Institute (EMI) of the Federal Emergency Management Agency (FEMA).

According to the Carley Corporation home page, "FEMA wanted to present these officials with an accurate simulated emergency to test strategic decision making." The goal of this training is to "… allow public officials to build experience and confidence in their critical thinking and decision making skills before facing the next disaster." This training is designed to simulate the same data elements, time constraints, and political, safety, financial, and legal pressures that public officials would encounter in an actual incident.

Observations: Uses specific metrics, disseminates best practices, can increase decision making skills, provides simulation support, and can measure learning.

Version: There is only one version; it has been distributed to the States by FEMA

Date Evaluated: March 4, 2003

Product Name: Emergency: Fighters for Life

Company:	**Contact Information:**
The WizardWorks Group, Inc. 2300 Berkshire Lane North Plymouth, MN 55441 **Web Site**: www.wizworks.com	http://www.ina-support.com Infogrames, Inc. 417 Fifth Avenue New York, NY 10016 Tel. 212-726-6500 support@wizworks.com

Key Product Attributes:

GOTS/COTS: COTS **Application Area:** Entertainment **Media Scale:** Individual and possibly Group **Product Type:** Computer Simulation Game	**Training Type It Supports:** Awareness and possibly Pre-Training **Functional Area(s) It Supports:** EMS, EMA, Fire, HazMat, and Law Enforcement **Primary Target Audience:** Commanders and possibly First Responders and Local Officials

Product Description:

This product is a computer game that allows the user to practice strategic and tactical decision-making while responding to thirty different accident or disaster scenarios. The main challenge is in choosing how to deploy emergency vehicles and teams in a timely manner according to the type of incident or scenario. Emergency responders must then be directed to perform certain actions to rescue victims, perform first aid, and transport them to the hospital. The simulation tests basic incident response decision-making in pre-scripted scenarios.

The simulations are pre-defined scenarios, which have either implicit or explicit constraints. Emergency bases are located in a given geography and vehicles and responder personnel have fixed rates of movement. Some scenarios require task completion in a given amount of time, or before a victim dies of injuries. Only certain types of responders can deal effectively with WMD type events; firefighters in Hazmat suits, for example. The simulation software determines the success or failure of each mission based upon successful task completion, timing, and victim health. Different degrees of victim injury require different types and speeds of emergency response. Similarly, entities have realistic constraints on their actions; ambulance orderlies cannot fight fires, firefighters cannot direct traffic, police cars cannot tow vehicles.

Observations: Can increase decision making skills

Version: N/A

Date Evaluated: March 31, 2003

Product Name: Emergency Preparedness Incident Command Simulation (EPiCS)

Company:	**Contact Information:**
TRADOC Analysis Center (AST, Inc.)	Dr. Julie Seton, EPiCS Project Leader
Building 1400	505-678-4949
WSMR, NM 88002	Setonj.contractor@trac.wsmr.army.mil
Web Site:	

Key Product Attributes:

GOTS/COTS: GOTS	**Training Type It Supports:** Functional Exercise, Full Scale Exercise, Distributed Collaborative Exercise, and possibly Equipment Training
Application Area: Training, Exercise, and Operational	**Functional Area(s) It Supports:** EMS, EMA, Fire, Government Administration, HazMat, Law Enforcement, Public Health, Public Works, Healthcare, and Public Safety Communications
Media Scale: Small Multi-User and Large Multi-User Teams, and possibly Individual and Group	**Primary Target Audience:** First Responders, Commanders, Local Officials, State Officials, and Possibly Federal Officials
Product Type: Human Controlled Computer Simulation	

Product Description:

EPiCS was developed to support emergency response capabilities and events. It is a simulation and visualization training and exercise tool consisting of a set of 20 software packages designed to provide realistic practice for public safety managers – including response to WMD. The two main elements of EPiCS are the Janus simulation engine and the visualization and exercise playback tool Operational Test Visualization (OTVIS).

EPiCS can be used to model the physical, geo-specific environment and entities of choice. It provides human-in-the-loop (HITL) simulation in which human participants control the action of simulated entities, discrete events and behaviors are attributable to individual entities.

The training/exercise audience does not interact with the simulation itself – they interact with role-players who are interacting with the simulation. After the exercise, in an After Action Review, the training audience will be exposed to visualizations produced by playback of the simulation.

Observations: Uses specific metrics, can be used to audit plans, disseminates best practices, tracks participant performance, provides structured feedback among players, can increase decision making skills, can track interactions among participants, provides simulation support, provides remote observation, can be used to practice communication, provides a distributed collaborative decision making environment, and it can measure learning

Version: Experimental Prototype of Operational System

Date Evaluated: April 5, 2003

Product Name: EMS Simulator

Company:	**Contact Information:**
Less Stress Instructional Services	John Mateus, Mary Rongo
138 Buena Vista Ave.	888-277-3671
Hawthorne, NJ 07506	jmateus@lessstress.com
Web Site: www.lessstress.com	

Key Product Attributes:

GOTS/COTS: COTS	**Training Type It Supports:** Awareness, Pre-Training, possibly Distributed Collaborative Exercise
Application Area: Training and possibly Entertainment	**Functional Area(s) It Supports:** EMS, EMA, Public Health, Healthcare, and Public Safety Communications
Media Scale: Individual and possibly Group	**Primary Target Audience:** First Responders and Commanders
Product Type: Online Computer Based Training	

Product Description:

EMS Simulator is a web-based training accessible to the general public. The training is accessed through www.lessstress.com and is designed to increase knowledge and awareness of "pre-hospital" medical emergencies. The site claims that the delivered content is not meant to replace normal "hands on" training courses. The targeted users are emergency medical personnel who opt to refresh their training in the delivery of first aid to a range of victims. Targeted users for the CPR simulations are bystanders in non-specific or work settings.

Both the CPR and EMS applications are Web-based, individual, fixed-path computer-based training tools. Strictly speaking, these applications are not simulations, but deterministic, discrete models used to test functional processes in a narrative format. Users progress through sets of Web pages by making decisions that conform to pre-defined decision logic representing first responder best practices. The user selects discrete choices of action in a given stage of each scenario. If the wrong decision is made, the user is coached that there is a more appropriate selection and forced to return to the previous screen. All scenarios for both the CPR and EMT tools are fixed-path training providing the user with established decision logic.

Observations: Disseminates best practices, can increase decision making skills, and uses a distributive collaborative decision making environment.

Version: N/A

Date Evaluated: March 12, 2003

Product Name: Human Patient Simulator

Company:	**Contact Information:**
Medical Education Technologies Inc. (METI) 6000 Fruitville Road Sarasota, FL 34232 **Web Site**: www.meti.com	Ron Carovano: Director of New Business Development. rcarovano@meti.com 941-504-5563 Dina Dennis, Southern Regional Sales Manager.

Key Product Attributes:

GOTS/COTS: GOTS and COTS **Application Area:** Training, Exercise, and possibly Analysis **Media Scale:** Individual, Group, and Small Multi-User Team **Product Type:** Specialized Hardware Simulation/Model	**Training Type It Supports:** Equipment Training, Part-Task Training, Pre-Training, Drills, Functional Exercise, and Full Scale Exercise **Functional Area(s) It Supports:** EMS, Healthcare, Public Health, and possibly Fire, HazMat, Law Enforcement, and Public Works **Primary Target Audience:** First Responders

Product Description:

The Human Patient Simulator is a computer model-driven, full-sized mannequin. The mannequin allows participants to practice emergency response (medical diagnosis and treatment) with a simulated patient in realistic scenarios. The mannequin systems are equipped with a variety of electronic, hydraulic and mechanical subsystems that imitate patient physiology; the chest rises and falls; and it has realistic heart sounds. Real treatment options can be used on the mannequin; blood pressure can be checked with BP cuff, chest compressions actually register, and it responds to medications.

This system has the basic capabilities to support training and exercises. HPS uses six medical education areas: anesthesia, medicine, emergency medicine, nursing, respiratory care, and paramedic/EMT. Exercises and scenarios have been adapted to portray the effects of biological, chemical, and radiological/nuclear weapons on humans.

Observations: Uses specific metrics, can be used to audit plans, disseminates best practices, tracks participant performance, provides structured feedback among players, can increase decision making skills, can track interactions among participants, provides simulation support, can be used to practice communication, focuses on hospital training and exercises, and it can measure learning

Version: Version 6

Date Evaluated: February 25, 2003

Product Name: Multi-Layer Decision Simulation – school violence (MLADS)

Company:	**Contact Information:**
Crisis Intervention Resources	Roger Mason
8640 Oakdale Ave.	818-886-3088
Winnetka CA 91306	rogcmason@aol.com
Web Site:	

Key Product Attributes:

GOTS/COTS: COTS	**Training Type It Supports:** Drills, Tabletops, Functional Exercises, and possibly Awareness
Application Area: Training and Exercise, possibly Operational	**Functional Area(s) It Supports:** Fire, Law Enforcement, Public Safety Communications
Media Scale: Small Multi-User Team	**Primary Target Audience:** First Responders, Commanders, and Local Officials
Product Type: Board Game Simulation	

Product Description:

MLADS is a board game designed to teach and exercise decision-making in the context of a school violence scenario (an active shooter in the school). Currently MLADS is focused at two layers of decision-makers in: fire, law enforcement, and public safety communication disciplines. The game emphasizes effective incident command system (ICS) and unified command (UC) operation.

The game consists of a 3-D representation of a school and its immediate neighborhood, about 2-3 blocks in all directions. To date, CIR has developed versions for Burbank and New Brunswick NJ that use an actual school and the actual streets & houses in the surrounding neighborhood.

MLADS emphasizes how sensitive this situation is to initial conditions, so decisions made early on will generate large effects later. Thus the scenario focuses on the initial 1-2 hours at the scene. The scenario is described by the facilitator, who provides new events as the situation unfolds and can redirect the scenario as needed, based on player actions.

The facilitator determines how events will proceed, based on a general list of scenario events. This involves identifying in advance some key skill sets: evacuate school, look for gunman, and control scene.

Observations: Can increase decision making skills and can be used to practice communication

Version: N/A

Date Evaluated: November 14, 2002

Product Name: NBC CTS 2000 (Note that the name may change in future)

Company:	**Contact Information:**
Army Medical Department Center & School, Battle Simulation Center AMEDDC&S Battle Simulation Center Fort Sam Houston, Texas 78234 **Web Site**: http://www.cs.amedd.army.mil/simcenter/NBC%20CTS.htm	William J. McCormick Training Systems Analyst/Webmaster, DAC Office: 210-221-0944 Mobile: 210-559-6395 http://www.cs.amedd.army.mil/simcenter

Key Product Attributes:

GOTS/COTS: COTS **Application Area:** Exercise and Possibly Analysis **Media Scale:** Individual and Small Multi-User Team **Product Type:** Virtual Computer Simulation	**Training Type It Supports:** Part Task Training, Pre-Training, Full Scale Exercise, Full Scale Exercise Reinforcement, Distributed Collaborative Exercise, and possibly Tabletop, and Functional Exercise **Functional Area(s) It Supports:** EMS, EMA, Healthcare, Public Health, and possibly, Fire, Government Administration, HazMat, Public Safety Communications, and Public Works **Primary Target Audience:** First Responders, Commanders, Local Officials, State Officials, and Federal Officials

Product Description: NBC CTS is a role- and task-based simulation which supports training of Army medical personnel in the diagnosis, treatment and management of mass casualties generated from the use of nuclear, biological and/or chemical weapons as well as other disasters/injuries. Players take on the roles for various Army medical personnel who would have casualty case responsibilities in the event of such an attack. It is task oriented in that the simulation projects updated data (e.g., reduction in personnel) and it takes into consideration amount of time it takes to complete a task. It can be used to develop training and exercises. It serves as a decision support tool for command control personnel (such as EOC personnel) and can be used for stand-alone exercises.

Observations: Uses specific metrics, can be used to audit plans, disseminates best practices, tracks participant performance, provides structured feedback among players, can increase decision making skills, can track interactions among participants, provides simulation support, can be used to practice communication, can focus on hospital training and exercise, provides a distributed collaborative decision making environment, and it can measure learning

Version: NBC CTS

Date Evaluated: March 4, 2003

Product Name: Pollution Incident Simulation, Control, and Evaluation System (PISCES)

Company:	**Contact Information:**
Transas (USA) Inc. 19105 36th Ave. W.,Suite #101 Lynnwood, WA 98036 **Web Site**: http://www.transas.com	Virtual Planet Services, David S. Nieri 516-674-3626 (Phone) 928-222-2816 (Fax) vplanet2000@yahoo.com dnieri@transasusa.com

Key Product Attributes:

GOTS/COTS: COTS **Application Area:** Training, Exercise, Operational, and Analysis **Media Scale:** Small and Large Multi-User Teams and possibly Individual and Group **Product Type:** Human Controlled Computer Simulation	**Training Type It Supports:** Drills, Tabletops, Functional Exercise, Full Scale Exercise, Full Scale Exercise Reinforcement, National Training Exercise and possibly Equipment Training, Awareness, Part Task Training, and Pre-Training **Functional Area(s) It Supports:** EMS, EMA, Fire, Government Administration, Healthcare, HazMat, Law Enforcement, Public Health, Public Safety Communications, and Public Works **Primary Target Audience:** Commanders, Local Officials, State Officials, Federal Officials, and possibly First Responders

Product Description: PISCES is a complex simulation-based system originally designed to develop and control large-scale multi-agency response-preparedness exercises for the U.S. Coast Guard; it is being expanded to address other types of incidents including WMD (PISCES2). It includes a variety of exercise development, control, simulation, data collection and AAR capabilities.

PISCES includes control, monitoring, AAR, Geoplot and status displays, as well as GPS monitoring link to real on-scene assets. The system uses simulation models, scripts, and real-time control inputs. There are manual and automatic/semi-automatic control of resources and other time-dependent scenario actions/events.

The system can be used to support development of full-scale exercises, conduct full-scale exercises, and evaluate response plans.

Observations: Uses specific metrics, can be used to audit plans, disseminates best practices, provides structured feedback among players, can increase decision making skills, can track interactions among participants, provides simulation support, uses remote observation, can be used to practice communication, can focus on hospital training and exercise, and it can measure learning

Version: PISCES2

Date Evaluated: February 25, 2003

Product Name: Tom Clancy's Rainbow Six

Company:	**Contact Information:**
Red Storm Entertainment 3200 Gateway Ctr. Blvd., Suite 100 Morrisville, NC 27560 **Web Site**: www.redstorm.com	http://support.ubi.com

Key Product Attributes:

GOTS/COTS: COTS **Application area:** Entertainment **Media Scale:** Individual, Group, Small multi-user team, and large multi-user team **Product Type:** Computer Action Game	**Training Type It Supports:** Awareness, Pre-Training **Functional Area(s) It Supports:** Law Enforcement **Primary Target Audience:** First Responders

Product Description: Rainbow Six is a computer action game based on a Tom Clancy Novel and designed for entertainment purposes. The Rainbow Six game places the user in tactical command of a team of counter-terrorist operatives, much like a military combat unit or a SWAT team. The operatives attack a structure, shooting terrorists along the way, to reach a variety of objectives. There are 16 missions, each has objectives that are explained in a briefing, which is presented in both text and audio formats to the user. After listening to the briefing and completing a planning stage, the action begins. The user is part of the attack and sweeps through a structure shooting terrorists along the way. The challenge is to kill the terrorists without being killed yourself and to learn how to do things such as open doors, disable bombs and security systems, and use all the commands available in the game.

The primary focus of this game is tactical; players plan the attack, distribute resources (personnel, materiel, and weapons), create redundancies, and try to get the teams to work together. There are bio-hazards that can kill your player if he does not have PPE. The missions are pre-defined and your player must complete each one successfully in order to move on to the next one. Missions can be replayed as often as a player chooses.

Observations: Uses specific metrics, can be used to audit plans specific to the game, disseminates best practices, provides structured feedback among players, can increase decision making skills, can track interactions among participants, uses remote observation, provides distributed collaborative decision making environment, and it can measure learning

Version: Rainbow Six (first version) and Demo for Rainbow Six: Raven Shield (version three)

Date Evaluated: March 4, 2003

Product Name: Virtual Emergency Response Training Simulation (VERTS)

Company:	**Contact Information:**
U.S. Department of Defense Program Executive Office, Simulation, Training and Instruction (PEO STRI) U.S. Army PEO STRI Orlando, Florida 32826	Major Lee Dunlap, S-CATT/ VERTS Project Director 407-384-5358 Lee_Dunlap@peostri.army.mil

Key Product Attributes:

GOTS/COTS: GOTS **Application Area:** Training, Exercise, and possibly Operational **Media Scale:** Individual, Group, Small Multi-User and possibly Large Multi-User **Product Type:** Human Controlled Computer Simulation	**Training Type It Supports:** Functional Exercise, Distributed Collaborative Exercise, and possibly Awareness, Pre-Training, and Tabletops **Functional Area(s) It Supports:** EMS, EMA, Healthcare, HazMat, Law Enforcement, Public Health, Public Works, and possibly Fire and Public Safety Communications **Primary Target Audience:** First Responders, Commanders, Local Officials, State Officials, and Federal Officials

Product Description: VERTS is intended for consequence management preparedness training of first responders and ICS staff for WMD events. VERTS is a virtual 3D simulation that provides a realistic representation of specific cities, including roads, building exteriors and some interiors, as well as other key geo-cultural features. VERTS combines a constructive simulation with the 3D synthetic environment. The constructive simulation maintains the terrain database, entity behaviors, and models of incident effects. The virtual reality "immersion" stations enable users to interact with the constructive simulation. Trainees control avatars in the synthetic environment, some of which are controlled by motion sensors on human-in-the-loop operators (e.g., a user can move towards a chemical spill and use detection equipment). VERTS is currently a prototype system seeking Federal funding to develop this technology into production systems for deployment at National Guard, active and reserve military sites.

Observations: VERTS will possibly be able to do the following: use specific metrics, to audit response plans, disseminate best practices, track participant performance, provide structured feedback among players, increase decision making skills, track interactions among participants, provide simulation support, use remote observation, practice communication, focus on hospital training and exercises, provide distributed collaborative decision making environment, and measure learning

Version: Prototype

Date Evaluated: April 11, 2003

Product Name: WMD Basic Awareness Training Interactive CD	
Company: Paratus Associates, LLC JITL.MPL.COM 304-472-9520 Ken Sharp 412-268-2613 **Web Site**:	**Contact Information:** Roger Dannenberg 412-268-3827 rbd@cs.cmu.edu ks5d@andrew.cmu.edu; jitl-list@cs.cmu.edu
Key Product Attributes:	
GOTS/COTS: COTS **Application Area:** Training **Media Scale:** Individual **Product Type:** Computer Based Training	**Training Type It Supports:** Awareness and Pre-Training **Functional Area(s) It Supports:** EMS, EMA, Fire, Government Administration, Healthcare, HazMat, Law Enforcement, Public Health, Public Safety Communications and Public Works **Primary Target Audience:** First Responders, Commanders, Local Officials, State Officials, and Federal Officials
Product Description: WMD Basic Awareness Training Interactive CD is a computer based application displayed using the freely downloadable Just In Time Lectures (JITL) player (included in the CD) that also supports URL (Universal Resource Locator) addresses that call up browsers, media players, and e-mail clients as needed. The player (and the required QuickTime installation kit) is included. The training was designed to run on Windows 3.1, and subsequent versions. The training was specifically designed to focus on disaster preparedness for WMD. It is in a lecture format. It consists of basic level awareness independent modules which provide definitions and examples of chemical properties, chemical agents, biological agents, incendiary and explosive, nuclear/radiological agents as well as information on safety and personnel protection. There is a discussion of key agency roles and responsibilities and crisis and consequence management with a focus on federal and general first responder roles. **Observations:** Can be used for pre-training	
Version: Version 0.3 **Date Evaluated:** February 25, 2003	

G. SUMMARY

The purpose of this phase of the MS&G product review effort was to develop a methodology for product evaluations, and to use it for first round of 17 products.

By adapting the ISD process, ThoughtLink developed a methodology incorporating the five analysis tasks shown in Figure 4 Section B.

The major steps were: sorting T&E requirements (and other behavioral data like skills or knowledge) into T&E categories; adding strategy elements to the T&E categories; evaluating products along multiple dimensions including the same strategy elements encompassed in the T&E categories; and mapping the 17 products to T&E categories.

One key element supporting the methodology is RRP, used to manage the large and evolving set of requirements and other responder behavioral items, as well as source documents, product ratings, and T&E categories. This consolidated set of T&E requirements, which links requirements back to their original source documents, will be useful for other ODP projects.

Seventeen products were evaluated using various criteria including: functionality, T&E attributes, strategy attributes, equipment and personnel needs, cost, etc. The intent of the detailed product reviews is to identify MS&G characteristics that would: (1) suggest whether the product is relevant to ODP T&E; (2) identify specific characteristics that may relate to the product's potential effectiveness in supporting ODP T&E; and (3) identify logistical factors (e.g., cost, maintenance requirements) that may affect decisions regarding the product's use in ODP T&E.

The product evaluations were developed and are maintained at different levels of detail: relatively fine-grain detail in individual Word documents and more synthesized/abstracted data in ratings on defined set of characteristics

The evaluation results presented here are intended to characterize the products, not to draw conclusions. That will have to wait until the final report in April 2004 that lays out a strategy for selecting and using products.

In general, the first round of products is a diverse set, ranging from individual to team, basic to advanced, supporting multiple functional areas and having various levels of fidelity. The product types included a tabletop physical model; PC-based and Internet instructional programs; PC-based tools and games; a physical simulation; large team simulations for conducting exercises and training; and a remote exercise control/monitoring/data-collection tool.

Another aspect of the product evaluation was to map products to T&E categories. Each category's T&E needs are met by at least one product and each product maps to somewhere between 3 and 20 categories. This seems to indicate that categories selected are appropriate.

A flexible framework has been created to support the product evaluations. It will continue to grow and change as new requirements are added and additional behavioral items (e.g., input characteristics) are added.

The methodology described here will be used for the two upcoming rounds of evaluations, with results available in October 2003 and March 2004.

This project will culminate with an April 2004 document, in which all three sets of evaluated products will be mapped to categories; certain categories of products will be recommended to ODP as well as factors to be considered when selecting specific products from a given category; and the over-arching ODP T&E system needs (curricula, program of instruction, etc.) will be discussed.

APPENDIX B: REVIEW CRITERIA FOR COMMERCIAL AND GOVERNMENT SIMULATION PRODUCTS

APPENDIX A: ATTRIBUTES USED IN PRODUCT EVALUATIONS

In this round of product evaluations, products were rated on the extent to which they met the attributes described in the following table. For a given product, possible values assigned to each attribute were:

O = No or N/A

1 = Yes

2 = Possible/Maybe.

Please note that as the requirements database is defined and additional products are evaluated, some attributes may evolve (e.g., they may no longer be used, additional attribute levels may be included, etc).

Attribute	Definition
After Action Review (AAR) Capability	
Playback of events possible	
Capable of providing automated data summary	
Designed to have SME produce AAR	I.e., no automated production of AAR.
No feedback or AAR available	
Applied Context	
Non-Specific	Training/exercising does not require the student/participant to use specific equipment.
Equipment	Training/exercise requires the student/participant to interface with (use) specific equipment.
Application Environment	
Analysis	Can be used as a stand-alone product to evaluate/analyze a specific issue. The results may also be used to support training, operations, or exercises.
Entertainment	Developed and marketed to provide diversion/fun - primary purpose was not intended to be training or exercising.
Exercise	"Tool for practicing and evaluating how prepared for and how well an organization responds to a potential terrorist incident". [1]
Training	Systematic acquisition of knowledge, skills, rules, concepts or attitudes that result in improved performance in same or other environment.
Operational	Can be used in a real-world response.
Content	
Knowledge	Recognizing or recalling ideas, material, or phenomena; Learning knowledge only, which can be achieved in any learning setting (e.g., classroom).

[1] HSEEP, Vol. IV: Exercise Evaluation and implementation [Draft] 2/04/03, p.4.

Applied	Given a new problem, ability to employ: correct abstractions, generalizations to problems, and procedures to problems. Involves the application of skills, as well as knowledge (hence, applied content).
Hands On	Requires specific practical activities (can be simulated).
Developer/Owner	
COTS	Commercial Off The Shelf.
GOTS	Government Off The Shelf
Ease of Use	
Easy	Simple navigation; Requires no/minimal computer knowledge; Aids provided (e.g., drop menus, drag and drop features).
Relatively Easy	Requires basic computer knowledge but not as much embedded assistance as above.
Difficult	Requires substantial computer knowledge and/or trained support staff.
Environment	
Generic	Train/exercise knowledge, skills, and abilities in a nonspecific environment.
Locale-specific	Typically requires the specific environment (e.g., city; at least through simulation/representation) in order for this product to effectively teach/exercise/train knowledge, skills, and abilities.
Face Validity	
High	Mostly reflects the job(s).
Medium	Parts of it reflect the job(s).
Low	Mostly differs from job(s).
Functional Area Supported[2]	
Emergency Medical Services (EMS)	Individuals who serve as first responders, EMT and paramedic on ground -based and aeromedical services to provide pre hospital care.

2 From Pelfrey, Kelly, and May, 2001. Unless otherwise cited.

Emergency Management Administration (EMA)	Organizations, both local and state, which are directed to coordinate preparation, recognitions, response, and recovery for WMD incidents. Categories - state and local EMA, voluntary organizations (VOAD), Professional Associations (American Society of Civil Engineers, American Institute of Architects, and so forth) Human Service Agencies, and private agencies supporting EMA activities.
Fire	Individuals that provide life safety services including fire suppression, rescue, arson investigation, public education, and prevention. Categories - firefighters, company officers, and fire marshal's office, USAR, and technical rescue.
Govt. Admin (GA)	Elected and appointed officials responsible for public administration of community health and welfare during an incident. Categories include - mayors, elected officials, executives, and chief administrative officers (city manager and supporting staff).
Healthcare (HC)	Individuals who prevent, treat, and manage illness and preserv mental and physical well-being.[3]
HazMat	Individuals who identify, characterize, provide risk assessment, and mitigate/control the release of a hazardous substance or potentially hazardous substance. Categories include technician, specialist, MMRS, environmental quality control, and private companies and contractors supporting hazardous materials activities.
Law Enforcement (LE)	Individuals with responsibility as sworn law enforcement officers. Categories - Patrol Officer, SWAT, Bomb Technicians, Evidence, Supervision/Management/Incident Command, and Investigations.
Public Health(PH)	Individuals who plan, direct, or coordinate medicine and health services in hospitals, clinics, managed care organizations, public health agencies, or similar organizations.[4]

3 Dictionary.com [On-line}, http://dictionary.reference.com/search?q=health%20care/.

4 Occupational Informational Network. O*Net OnLine. [On-line], http://online.onetcenter.org/.

Public Safety Communications (PSC)	Individuals who, through technology, serve as a conduit and link persons reporting an incident to response personnel and emergency management, to identify an incident occurrence and help to support the resolution of life safety, criminal, environmental and facilities problems associated with the event. Categories include - call takers, shift supervisors, medical control centers, and dispatchers (EMS, police, and fire).
Public Works (PW)	Organizations and individuals that make up the public/private infrastructure for the construction and management of these roles within the Federal level. The categories/roles include administration, technical, supervision, and craft (basic and advanced). Specifics - environmental services (water quality), solid waster, animal services, water treatment, public buildings, public parks, telecommunications, engineering, equipment services, electric districts, and digital cable.
Mode of delivery	
Self-paced	Student proceeds at own pace.
Instructor/facilitator	Requires an instructor or facilitator to help guide user.
Potential Responder Training Levels[5]	
Awareness	Individuals who are likely to witness, discover, or respond to a WMD incident and who have been trained to initiate an emergency response sequence by notifying the proper authorities of the release. They would take no further action beyond notifying the authorities of the release.
Performance (Operations)	Individuals who respond to releases or potential releases of hazardous substances as part of the initial response to the site of a WMD incident for the purpose of protecting nearby persons, property, or the environment from the effects of the incident. They are trained to respond in a defensive fashion without actually trying to stop the incident. Their function is to contain the incident from a safe distance, keep effects from spreading, and prevent exposures.

5 From Pelfrey, Kelly, and May, 2001.

Technician (Specialist)	Individuals who respond to WMD incidents and potential WMD incidents for the purpose of stopping the incident or treating casualties. They assume a more aggressive role than a first responder at the operations level in that they will approach the point of release in order to prevent or mitigate the release of a hazardous substance or treat affected personnel.
Planning & Management (includes ICS)	Incident commanders who will assume control of the WMD incident scene beyond the first responder awareness level and have emergency response plan training equal to the first responder operations level as well as emergency response plan competency.
Integrated Systems	Multi-jurisdictional beyond IC level.
Product currently is	
Board Game	
Computer Simulation	
Other hardware/software	
Product Replayability	
Multiple	Dynamic paths through the product and more than 1 outcome possible.
Static configuration	Fixed path, only 1 right way to use the product.
Student Level	
Basic	A person who has recently become involved with WMD planning or response activities; generic skills and knowledge related to WMD.
Advanced	A person who has considerable experience with WMD incident response or planning.
Student Unit	
Group	Participants receive the same instruction (e.g., classroom, CBT lab) but no interdependence or unique roles are necessary.
Individual	Each student/participant is trained/exercised individually.
Small team	<25 Participants have unique roles and the instruction provided reflects those distinct roles; Must be interactive.

Large team	>=25 Participants have unique roles and the instruction provided reflects those distinct roles; Must be interactive.
Target Audience	
1st Responders	
Commanders	
Local Officials	
State Officials	
Federal Officials	
TLI Recommendations/Observations	
Specific objectives, criteria, metrics	Clear expected actions and conditions are the set of circumstances under which a task is performed, specified prior to T & E or during, in a way that user actions can be tied to performance.
Audit and evaluate plans and procedures prior to an exercise/Plan development	Example: does the tool allow for “playing out” scenarios to find out gaps in plans?
Dissemination of best practices/expansion of learning benefits	Are best practices embedded in this tool? For example, does the tool (including the facilitator, if that’s the intended use) guide/lead the user towards a "best" course of action through the T or E)? And/or does the product allow others to see results (e.g., report generation and archive of results) so that they may learn or exercise similarly?
Tracking participant performance through multiple tries	Where performance may mean score. This implies pre- and post-test capabilities.
Structured feedback among players	Are user’s consistently aware of others actions (during or after)?
Increased decision-making	This product requires decision-making for it to progress.
Tracking interactions/info-sharing among players	Does this tool provide the capability to visually depict information for different players' perspectives? And/or does this tool allow for tracking of others' actions during or after the T or E.
Simulation support	Help for adjudication of decisions.
Remote observation	For players in different sites and/or other non-players to observe actions

Enhanced T & E Communication	Is communications an essential part of this product for actions to progress? Thus allowing for improved communications with use.
Hospital T & E	Does this tool allow for this (if chosen as a possible focus)?
Distributed, collaborative, decision-making environment	E.g., several trainee/participants, comprising a sub-tam component could be engaged in the collaborative training/exercising remotely linked over a distributed network (local or wide area or the Internet) for the training/exercise, or in a single room.
Measure of learning/retention/ Transfer of Learning	Record user performance, use tool at later time and compare results (E.g., pre-test and post-test capabilities). .
Type of Learning Supported	
Initial Acquisition	Individual(s) acquire knowledge & skills for the first time.
Improvement	Individuals continue to develop previously acquired knowledge & skills.
Maintenance/Refresher	Individuals review previously acquired knowledge & skills but no additional knowledge/skills are gained.
Type of Training/Exercise	
Part-task	Breaking complex set of skills to learn each one (then maybe bring back together).
Drill	Repetitive small subset. Going through specific set of tasks; practice - no acquisition of new skills; may involve a variety of tasks (vs. isolation of one for part-task training). May involve multiple sets of tasks and multiple people.
Table Top Exercise (TTX)	Discussion of process and decisions one would make, often without actually making those decisions.
Functional Exercise (FE)	Similar to drill but larger and more complex. Would involve all elements, while drill might look at smaller subset of elements instead of everybody practicing together from start to finish.

Full Scale Exercise (FSE)	Involves use of actual resources, in the field where everyone performs their job functions together.
Full Scale Reinforcement	Strengthening/refresher of knowledge, skills applied during a FSE.
Equipment Training	
Awareness	User has relatively little experience with WMD incident response. These persons are learning or practicing fundamental skills and knowledge.
Pre-Training	Acquisition of knowledge & skills necessary for exercise/training conduct.
National Training Exercise	
Type of WMD Event Supported	
Chemical	Chemical agents used.
Biological	Biological agents used.
Radiological	Involves release of radiation but was not caused by a nuclear explosion.
Nuclear	Nuclear device used with release of large quantities of radiation.
Explosive	Explosives used.

APPENDIX B: REVIEW CRITERIA FOR COMMERCIAL AND GOVERNMENT SIMULATION PRODUCTS

APPENDIX B: REVIEW CRITERIA FOR COMMERCIAL AND GOVERNMENT SIMULATION PRODUCTS

Basic Product Information

Name of Product:

Product is hardware, software, or both?

Large multi-user system, small multi-user product, or individual-user product?

Focus/specialty of product:

Incident response operational tool/system:
Domestic, military, other users?

Incident response training/exercise tool/system:
Domestic, military, other users?

Other operational tool/system (Identify):
Typical users (e.g., Military, consumer)?

Other training/exercise tool/system (Identify):
Typical users (e.g., Military, consumer)?

Functional-area identification of product (Broad range, or specific; see Julia's Product table):

Developer/owner: Name of person or entity that created, owns, sells the product (identify each, if different; identify relationship between each):

Contact info ref. technical questions (Person, title, organization, telephone, email):

Contact info ref. buying the product (Person, title, organization, telephone, email):

COTS/GOTS (circle one).

Is product directly applicable to counter-terrorism training/exercises, or modifications are required? If modifications are required, briefly describe them.

Product status (Production version in use; prototype in use; under development)?

If in use, identify users, types of use:

Product Description

Describe product, briefly. Address major functional characteristics (e.g., Individual CBT, large-team trainer, web-based collaborative game, VTC tool, PC-based incident response tool):

Intended for operations, training/exercises, or both?

If training/exercises, is it an instructor/controller/evaluator tool, or training media?

Intended for individual, group or team use? [1]

If multiple users, identify the range of persons it can simultaneously support (min-max)?

Number persons usually trained simultaneously?

Large multi-station system, or based on individual PC's?

Custom/proprietary hardware required?

Identify major product components[2] *and their operation ... hardware, software, simulation and functional (e.g., Multi-player collaboration, gaming, 3-d interactive model, 2-d topography, video, plume model, questions & answers, HELP):*

- Hardware:
- Software:
- Simulation:

If simulation models are used, identify their qualitative validity level (if possible):

Stand-alone product, or require other hardware and software to function[3] *(e.g., external simulation models, data base, operational equipment):*

If other hardware and/or software required, or typically used, identify it/them.

Other facilities required (Home/office; building, multiple rooms, auditorium; LAN; etc.)?

Web-based application, LAN, or a single computer/system-based application?

Can the training be administered over a wide area network or a local area network?

Is an instructor or facilitator needed?

If not, how is training conducted (e.g., Individual self-paced)?

If not, how is training managed (e.g., Testing, certification of completion, etc.)?

Describe unique user interface characteristics:

Other important product characteristics:

Product Operating Requirements & Cost

Purchase or license product, both, or optional?

Initial acquisition cost (purchase; licensing fees):

Product itself:

Other necessary support, software, equipment:

Contractor(s) required to run product? If yes, level of support required (people, costs, etc.)?

Number of staff required to setup, and operate product:

Staff training required to use product (identify briefly ... type, time):

Cost for staff training on product (Cost to purchase training):

Equipment/facilities required to install and use/operate product (If more than one personal computer; or, if special PC components are required):

Expected costs?

Product maintenance requirements/recommendations (identify briefly):

Maintenance costs (Expected or required software, hardware maintenance):

Software operating system (Windows XP, 2000, etc.; MAC OS; UNIX; other):

Can product be customized? How? Cost?

Product modifications required to support counter-terrorism training/exercises:

Modifications:

Range of potential costs:

Personal Computer Requirements *(if appropriate)*
(Most software will offer minimum and recommended configurations).

Processor speed (in Mhz):

Memory:(SDR/DDR)

Free disk space:

Internet connection speed:(if any)

Display adapter:[4, 5]

CD-ROM speed:

Optional accessory requirements:[5]

Training/Exercise Characteristics

Product may support training, exercises, or both?

Potential type of WMD event product can support:
- *Chemical –*
- *Biological –*
- *Radiological –*
- *Nuclear –*
- *Explosive –*

Constraints on supported exercises or scenarios?

Potential disciplines product can support:
- *Emergency medical services*
- *Emergency management agency*
- *Fire*
- *Governmental administration*
- *Health care*
- *HazMat*
- *Law enforcement*
- *Public health*
- *Public safety communication*
- *Public works*
- *Global ... or other (Pelfrey)*

Provide additional sub-discipline description if possible.

Potential types of learning product can support (S&K):
- *Initial/acquisition*
- *Improvement*
- *Maintenance/refresher*

Target audience:
- *First responders/Crisis managers/Incident Commander*
- *Law enforcement/Fire& Rescue/Hospital personnel*

Potential responder training level(s)/categories product can support:
- *Awareness –*
- *Performance [Operations]*
- *Technician [Specialist]*
- *Planning & Management [Incident Command*]
- *Integrated Systems [Multi-jurisdiction]) (5th category identified by Pelfrey*) -

Potential equipment and/or facilities product can address:

Training/exercise objectives potentially supported (High level ... e.g., Equipment operation, knowledge of chemical agents, ICS process, EOC decision-making, team communications):

Training content description (what trained), in addition to preceding item (Brief):

Required student/participant input characteristics to use product (Functional categories, not detailed) (Also, note if basic, intermediate or advanced proficiency is required) :

Potential training/exercise types product can support:

- *Classroom -*
- *Individual self-paced -*
- *Seminar/workshop -*
- *Drill -*
- *Individual and small-team exercises -*
  - *Simulation-supported -*
  - *Gaming -*
  - *Collaborative -*
- *Tabletop -*
- *Functional -*
- *FSE -*
- *Other*

Potential instructional-strategies/delivery-methods (Identify potential examples at high-level ... e.g., classroom, real-time exercise, self-paced individual CBT, video scenario, Q&A, positive guidance, case study, web-based collaborative, real-time VTC):

Exercise characteristics (Long, short; tutorial; self-paced; normal operation, failures; simulation-supported; scripted/instructor-controlled):

Exercise/scenario length/time(typical):

Process and time to:

Develop new exercise/scenario:

Modify an exercise/scenario:

Setup an exercise/scenario to run:

Does a curriculum already exist?

If so, briefly describe its form and content:

Instructional Assistance Features

Scenario/exercise run/conduct features (e.g., Positive guidance, student cues, scripted scenario, automatic reactive scenario):

Student/participant/team evaluation features; identify each (e.g., Scenario/exercise data recording; performance measures; performance standards):

Student/participant/team feedback features (immediate and AAR); identify each (e.g., Text/graphic information displays, animation; audio; situation cues; immediate/delayed; etc.):

Information/knowledge base contained in product (Briefly identify any relevant WMD-specific content [e.g., Chemical agent summaries]):

HELP features (Briefly identify):

Instructor/controller/evaluator tools:

> *Scenario/exercise design & development (e.g., Instructor handbook; scenario conditions & events scripting; fast-time models; scenario library; MSEL support)):*
>
> *Scenario/exercise conduct (e.g., Student-action/situation warning/cues; scenario/exercise conduct controls; real-time/fast-time/time-jump; data recording & real-time analysis & display; displays & controls to support immediate feedback to participants):*
>
> *AAR support tools (May overlap with "Student/participant/team feedback features", above):*

Data recording & storage features (e.g., Scenario events; student performance):

Analysis features (e.g., Post-exercise/scenario analysis tools; real-time analysis tools):

Training/exercise fidelity:

> *Environment (including situation/scenario):*
>
> *Hardware:*
>
> *Information (including interaction with other persons):*

---

[1] Group training occurs when all participants are receive the same instruction, such as in a classroom or a computer-based training lab. Team training occurs when participants have unique roles, and the instruction provided reflects those distinct roles, such as real-time SWAT team exercises or a submarine combat system trainer. Team training would be interactive.

[2] Example hardware components: computer terminal, large screen display, equipment or mockups, white board, manuals. Example simulation components: gas plume model, emergency vehicle response model (time & route); equipment; communications; people & other responders. Example functional components: organizations, equipment, environment; scenarios/exercises; communications; development and run-time tools; performance measurement and diagnostic tools.

[3] Other necessary hardware/software may include, for example, simulation models, other people/stations, actual equipment, LAN, high-speed (broad-band) internet connection.

[4] If the software is graphics or resolution intensive the minimum graphics requirements may be critical. Most software will advise the consumer of this. Many computers have onboard

graphics, which can be accessed in the BIOS menu. The renderings by these onboard adapters are limited. Further, the distinction must be made between generic graphics cards, and 3-d graphics accelerators, and how much dedicated memory is available on the card. Some models and sims are rendered in high polygon 3-d environments which means that the maximum amount of polygons were used in constructing the environment giving it a higher resolution and a more realistic appearance. Also video, and streaming video components in software counts as high resolution graphics. If these are present in the software, display adapter capability is an important criterion.

[5] If the software has high resolution graphics it is important to know what other secondary drivers or programs are available to aid in the 3-d renderings. Direct X, or other Graphic User Interfaces (GUI) are integral for glide and mip-mapping capabilities. Failure to consider these in a high polygon 3-d environment can cause repeated desktop crashes even when the system meets the *recommended* requirements.

APPENDIX C: SELECTED PRODUCT ATTRIBUTE RATINGS

APPENDIX C: SELECTED PRODUCT ATTRIBUTE RATINGS

The two tables in this section depict some of the attributes that were rated for the seventeen MS&G products reviewed. Product acronyms are listed in the left-most column, and attributes are rated as Currently Supported or Applicable (denoted by dark gray squares, and a 1), Potentially Supports or Applies (light gray cells coded 2), and Not Applicable or Does Not Support (blank cells). The tables are representative of the rating data used to compile some of the observations in Section E.2 of this document.

Table C-1. Selected Product Attribute Data 1

	Developer/ Owner		Application Environment					Mode of Delivery		Types of Learning it Supports		
Product	GOTS	COTS	Train	Exercise	Operation	Analysis	Entertain	Self-paced	Instruct / Facil.	Acquire	Improve	Maintain / Refresh
ATS		1		1					1		1	1
ADM		1	1	1	2			2	1	1	1	1
A5	1		1	1				1	2	1	1	1
CMS		1	1	1	1	1			1	1	1	1
COR	1		1	1	2	2			1	1	1	1
CRI		1	1	1	1	1			1	1	1	1
DMS	1		1					1	2	1	1	1
EFL		1					1	1		1		
EPI	1		1	1	1			2	1		1	1
EMS		1	1				2	1				1
HPS	1	1	1	1		2		1	1	1	1	1
MLD		1	1	1	2				1	1	1	1
NBC		1		1		2		1	1		1	1
PIS	2	1	1	1	1	1			1	1	1	1
R6		1					1	1		1		
VER	1		1	1	2			2	1		1	1
WBA		1	1					1		1		1
Currently Apply	6	12	13	12	4	3	2	8	11	12	13	15
	35%	71%	76%	71%	24%	18%	12%	47%	65%	71%	76%	88%
Potentially Apply	1	0	0	0	4	3	1	3	2	0	0	0
	6%	0%	0%	0%	24%	18%	6%	18%	12%	0%	0%	0%
Do Not Apply	10	5	4	5	9	11	14	6	4	5	4	2
	59%	29%	24%	29%	53%	65%	82%	35%	24%	29%	24%	12%

Table C-2. Selected Product Attribute Data 2

	Potential Responder Training Levels					Product Playability		AAR Capability			
Product	Aware	Perform (Ops.)	Technician (Specialist)	Planning & Mgt.	Integrated Systems	Dynamic	Static	Event Playback	Auto Summary	AAR by SME	No Feedback nor AAR
ATS		1	1	1	1	1				1	1
ADM	2	1	1	1	1	1		1	1	1	
A5				1		1			1		
CMS	2	1	1	1	1	1		1	1	1	
COR	2	1	1	1	1	1	1	2	1	1	
CRI	2	1	1	1	1	1		1	1	1	
DMS	1			1			1	1	1		
EFL	1	1				1			1		1
EPI		1		1	1	1		1	1	1	
EMS	1	1					1				1
HPS		1	1			1		1	1	1	
MLD	2	1		1		1				1	1
NBC			1	1	2	1			1	1	
PIS	2	1	1	1	1	1		1	1	1	
R6	2					1			1		1
VER		1	1	1		1		1	2	1	
WBA	1						1			2	1
Currently Apply	4	12	9	12	7	14	4	8	12	11	6
	24%	71%	53%	71%	41%	82%	24%	47%	71%	65%	35%
Potentially Apply	7	0	0	0	1	0	0	1	1	1	0
	41%	0%	0%	0%	6%	0%	0%	6%	6%	6%	0%
Do Not Apply	6	5	8	5	9	3	13	8	4	5	11
	35%	29%	47%	29%	53%	18%	76%	47%	24%	29%	65%

APPENDIX D: THOUGHTLINK OBSERVATIONS AND NEW AREAS FOR MS&G

APPENDIX D: THOUGHTLINK OBSERVATIONS AND NEW AREAS FOR MS&G

As described in Agrait et al., 2003, MS&G can be used in two ways: to augment the current exercise program and to provide new training and exercise opportunities. In the following diagram, green and yellow squares indicate the types of T&E offered in current ODP programs. Green squares indicate the primary training audience for a type of training and yellow squares denote the secondary training audience. For example, the primary training audiences for equipment training are first responders and their supervisors, in fire and police departments as well as emergency services staff. Blue squares identify new training and exercise areas that hold promise for MS&G.

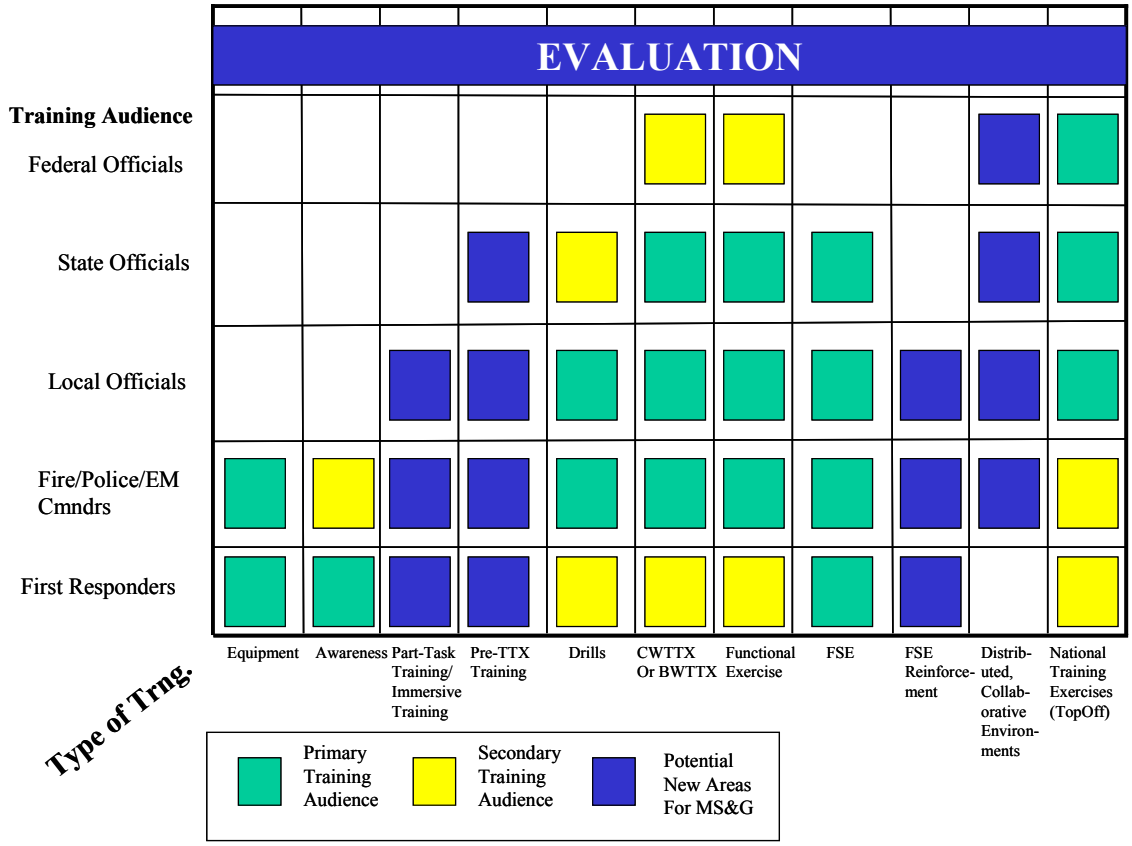


Figure D-1. ODP Training & Exercise Types and Opportunities for MS&G

These new areas, and related observations where MS&G can potentially improve ODP's T&E conduct in the area of WMD preparedness, are summarized below. Details of this analysis can be found in Agrait et al., 2003. These areas were derived after conducting several responder and decision maker interviews and reviewing the current exercise program. Selected terms are defined in the Glossary.

Niche Area	**TLI Observation**	**MS&G capability example**
Distributed/Collaborative Environments	Many of the exercise objectives involve the coordination of a number of individuals from different organizations and agencies that only have the opportunity to collaborate during FSEs.	Web based exercises are relatively inexpensive and can span geographic areas.
Evaluation	Too often, evaluation is based solely on participant/evaluator/instructor impressions. Although the subjective assessments of these persons are critically important, they should be associated with objective assessments based on recorded data, to achieve the potential effectiveness of training and exercising.	Electronic recording of student actions and comparison across trials is possible.
Expansion of learning benefits	Learning must be passed from exercises, and individuals who participated in those exercises, to individuals who did not participate in those exercises.	Allow more players to participate more frequently.
Improve feedback among players	There is no structured feedback among players regarding how their actions affect each other.	Electronic tracking of player communications with replay capabilities.
Increase decision-making at TTX	Although at the introduction of a TTX decision-making (vs. plan formulation) is stressed as a goal, often no actual decision-making is required.	Players can view consequence of their decisions with simulation-supported tools.
Increase dissemination of best practices	Many cities do not want to simply practice procedures, they want guidance and advice on what are better procedures, information sources, products, etc.	Experiential learning tools leading the user to the best course of action.

Part-Task Training	Lack of hospital participation was cited as a current weakness in the T&E program.	Hospital focused tools used to test their capabilities prior to interagency exercises.
Plan Development	City planners, often had no good system for choosing objectives and could not articulate how they measured their accomplishment (for non-NLD exercises developed internally and without contractor support).	Tools allow plan testing and modification.
Pre-Training for TTX and FSE	The first exposure that many participants had to a WMD training event came at a TTX or FSE. Because of the complexity involved in such sophisticated exercises, participants sometimes appear to be overwhelmed.	MS&G can provide repeated practice at different experience levels prior to FSE.
Remote observation tools needed.	In some FSEs, there were too many non-players in the exercise area and responders seemed somewhat lackadaisical, or their response was compromised.	Web cams, VTC.
Utility of simulation support	Using a simulation to help in the adjudication of decisions made during an exercise provides a link between decisions and outcomes.	Tools customized to reflect real resources.
What-ifs immediately following the FSE	Cities probably could benefit from thinking again about players set up at (or near) the scene.	Playback of exercise scenario from other points of view; models allow movement of equipment around the site.

APPENDIX E: MAPPING OF EVALUATED PRODUCTS TO THOUGHTLINK OBSERVATIONS AND RECOMMENDATIONS

APPENDIX E: MAPPING OF EVALUATED PRODUCTS TO THOUGHTLINK OBSERVATIONS AND RECOMMENDATIONS

This appendix lists T&E requirements extracted from RRP that represent the recommendations proffered in Agrait et al., 2003 regarding new and existing T&E areas suitable for the use of MS&G. These came from our observations of the current program and are grouped under: General Observations, TTX Observations, Functional Exercise Observations, FSE Observations, and New Concepts for Improving T&E. Please refer to the following legend for interpretation of the tables.

Legend:

Requirements	TLI Observations/ Recommendation Source	Specific Observation/Recommendation	Location	Package	Traced-from
Requirement-unique ID #: Requirement text from database (RRP)	General exercise area where it was observed	Area of augmentation of current T&E program or new Opportunity for MS&G	Source Document in RRP	Location of requirement in RRP	Product the requirement traces to (see abbreviation key below)

Requirements	TLI Observations/ Recommendation Source	Specific Observation/ Recommendation	Location	Package	Traced -from
STRQ111: Risk analysis and preplanning **Know how to conduct risk analysis and assessments for hazardous materials and WMD agents and materials for on-scene situations and for preplanning potential terrorist targets in the local community**	General observations	Audit and evaluate plans and procedures prior to an exercise/Plan development	ERG**	H	ADM EPI VER
STRQ244: Formulate plan for crime investigation. **Be able to draft emergency response plan criteria for coordination of investigation of a potential crime scene involving multiple jurisdictions that may be on a WMD event scene.**	General observations	Audit and evaluate plans and procedures prior to an exercise/Plan development	ERG	O	ADM EPI VER
STRQ298: Victim transport plan drafting **Be able to draft emergency plan criteria for transport of victims of WMD events.**	General observations	Audit and evaluate plans and procedures prior to an exercise/Plan development	ERG	I	ATS (S) ADM DMS EPI HPS (s) NBC VER
STRQ317: Defining operational goals and objectives. **Know what steps to take to assist the on-scene incident commander in defining operational goals and objectives that are to be followed on site in bringing the event to a successful conclusion.**	General observations	Specific objectives, criteria, metrics/ measure of level of preparedness	ERG	I	ATS ADM CMS CRI DMS EFL EPI MLD NBC PIS VER

Requirements	TLI Observations/ Recommendation Source	Specific Observation/ Recommendation	Location	Package	Traced -from
STRQ459: Command and control operational objectives. **Know the command and control operational objectives for response to an incident.**	General observations	Specific objectives, criteria, metrics/ measure of level of preparedness	Pelfrey Part II	P	ATS ADM A5 CMS CRI EFL EPI MLD NBC PIS VER
STRQ548: Identify conflicts in planning. **Identify conflicts in planning.**	General observations	Audit and evaluate plans and procedures prior to an exercise/Plan development	BWTTX objectives	J*	ATS (S) ADM CMS CRI EFL EPI NBC PIS VER
STRQ565: Affected Area Access/Quarantine. **Review local, State, and Federal plans for area access control and quarantine issues.**	General observations	Audit and evaluate plans and procedures prior to an exercise/Plan development	BWTTX objectives	J*	ADM CMS CRI DMS EPI NBC PIS VER
STRQ573: Public information conflicts. **Review plans to preclude dissemination of conflicting data.**	General Observations	Audit and evaluate plans and procedures prior to an exercise/Plan development	BWTTX objectives	J*	CMS CRI DMS EPI PIS

Requirements	TLI Observations/ Recommendation Source	Specific Observation/ Recommendation	Location	Package	Traced -from
STRQ655: Structured feedback after modules. structured feedback between players during the modules as to how their actions affect each other.	General observations	Structured feedback among players	BWTTX St Petersburg	Other training-exercising	ADM CMS COR CRI EPI HPS NBC PIS VER
STRQ657: Education/training prior to the TTX (in plans, procedures, protocols, etc.).	New concepts for improving T&E	Pre-training	BWTTX Tacoma	A	ADM A5 DMS EMS EPI HPS NBC VER WBA
STRQ732: Id critical information and best practices. Highlight critical pieces of information that need to be shared and practices to be continued for successful even resolutions	General observations	Dissemination of best practices/expansion of learning benefits	ODP Exercise Requirements from TLI observations	Q*	ADM COR DMS EFL EMS EPI PIS VER
STRQ742: Evaluate current response v. best practices. Current response capabilities v. best practices	General observations	Dissemination of best practices/expansion of learning benefits	ODP Exercise Requirements from TLI observations	Q*	ADM CMS COR CRI DMS EMS EPI NBC PIS VER
STRQ777: Identify WMD related performance standards and	General	Specific objectives,	ODP	Q*	ADM

Requirements	TLI Observations/ Recommendation Source	Specific Observation/ Recommendation	Location	Package	Traced -from
measures	observations	criteria, metrics/measure of level of preparedness	Exercise Require-ments from TLI observa-tions		CMS COR CRI DMS EPI NBC PIS VER
STRQ414: Information sharing. **Assure vital information about the incident is effectively shared with all agencies**	TTX observations	Tracking interactions/info-sharing among players	Pelfrey Part II	N	ATS ADM CMS COR CRI EPI MLD PIS
STRQ490: Team approach to enhance decision-making. **Understand the processes for developing a team approach, able to enhance decision-making skills to be used during a WMD incident.**	TTX observations	Increased decision-making	Pelfrey Part II	A	ATS ADM A5 CMS CRI DMS EPI MLD NBC PIS VER
STRQ549: Exercise the local decision-making process. **Exercise the local decision-making process and identify areas needing refinements.**	TTX observations	Increased decision-making	BWTTX objectives	Q*	ATS ADM CMS COR CRI DMS EFL EPI NBC PIS \VER

Requirements	TLI Observations/ Recommendation Source	Specific Observation/ Recommendation	Location	Package	Traced -from
STRQ649: Practice real time decision-making. **decision makers need practice in making difficult decisions, in addition to knowing the process/procedures they would follow in arriving at their decisions. Hence, training should include the process of actually making difficult decisions in complex situations.**	TTX observations	Increased decision-making	CWTTX Orlando	Other training-exercising	ATS ADM A5 CMS COR CRI EPI HPS MLD NBC PIS VER
STRQ734: Test WMD-related decision-making	TTX observations	Increased decision-making	ODP Exercise Require-ments from TLI observa-tions	J*	ATS ADM A5 CMS COR CRI DMS EPI HPS NBC PIS VER
STRQ644: Simulation training before the FSE. **simulation-supported training should be performed between the TTX's and FSE**	Functional observations	Simulation support	BWTTX Orlando	Other training-exercising	ATS ADM A5 CMS CRI HPS NBC PIS R6 VER

Requirements	TLI Observations/ Recommendation Source	Specific Observation/ Recommendation	Location	Package	Traced -from
STRQ218: ICS communication **Be able to work within the incident command structure, including maintaining communication with appropriate personnel on the scene (e.g., incident commander) to properly implement scene security.**	FSE observations	Enhanced communication T&E	ERG	N	ATS ADM CMS CRI EPI MLD NBC PIS VER
STRQ290: EMS and hospital coordination **. Be able to coordinate appropriate medical treatment and care with local hospital emergency rooms' staff as called for under the local emergency response plan and regional response plan.**	FSE observations	Hospital T&E	ERG	P	ATS CRI NBC PIS
STRQ291: EMS coordination with ICS about hospital activity **Coordinate medical treatment and care with local hospital emergency activities with the on-scene incident commander .**	FSE observations	Hospital T&E	ERG	O	ATS ADM CMS CRI EPI NBC PIS VER
STRQ578: Multi-agency and multi-jurisdictional communications. **Assess the ability to establish and maintain multi-agency and multi-jurisdictional communications in response to a WMD incident**	FSE observations	Enhanced communication T&E	CWFSE objectives	Q*	ATS ADM CMS COR CRI EPI NBC PIS
STRQ607: Demonstrate the use of secure communication systems. **Demonstrate the use of secure communication systems.**	FSE observations	Enhanced communication T&E	SHEEP	J*	CMS COR EPI NBC (s) PIS

Requirements	TLI Observations/ Recommendation Source	Specific Observation/ Recommendation	Location	Package	Traced -from
STRQ609: Interoperability of communications assets. **Evaluate the interoperability of communications assets used by different responding agencies.**	FSE observations	Enhanced communication T&E	SHEEP	Q*	ATS ADM CMS COR CRI EPI NBC PIS
STRQ663: Better exercise communications. **Better exercise communications needed (equipment and procedures). Evaluators sometimes were not aware of scenario events, to the extent they missed some important activities. This was a communication problem, between controllers and evaluators.**	FSE observations	Enhanced communication T&E	CWFSE Las Vegas	Q*	ATS ADM CMS COR CRI EPI NBC PIS
STRQ668: Aids for controllers and evaluators. **Aids for controllers and evaluators that would permit remote monitoring, including recording of observed data (e.g., observation cues, data collection tools)**	FSE observations	Remote observation	CWFSE Las Vegas	Input characteristics (materials equipment)	ADM CMS COR CRI EPI PIS VER
STRQ728: Communication back up systems. **Identify needed communications backup systems (e.g., back up POCs, redundant communication systems)**	FSE observations	Enhanced communication T&E	ODP Exercise Require-ments from TLI observa-tions	J*	ADM CMS COR CRI EPI PIS VER
STRQ55: Hazard/risk analysis demonstration **Demonstrate skill and knowledge in preparing hazard and risk analysis of potential WMD targets in the local community.**	New concepts for improving T&E	Measure of learning/retention & Transfer of Learning	ERG	J*	ATS (s) CMS CRI EPI NBC(s) PIS VER

Requirements	TLI Observations/ Recommendation Source	Specific Observation/ Recommendation	Location	Package	Traced -from
STRQ59: Multiagency drill **Participate in a joint training exercise or drill with other emergency response organizations that are expected to participate in responding to a potential WMD event in the local area**	New concepts for improving T&E	Distributed, collaborative, decision-making environment	ERG	Q*	ATS ADM CMS COR EPI NBC PIS ATS
STRQ140: mock WMD drills **Participate with other local emergency response organizations in joint training exercises or drills involving selected specialized tasks or WMD mock agents**	New concepts for improving T&E	Distributed, collaborative, decision-making environment	ERG	Q*	ATS ADM CMS COR CRI EPI NBC PIS VER
STRQ484: Know special dangers of WMD site for perimeter determination. **Understand and demonstrate knowledge of the types of agents, movement patterns, chemistry, and hazards of WMD agents. Apply these elements and factors to the scene and how they affect perimeters, isolation zones, physical properties, and dissemination methods.**	New concepts for improving T&E	Measure of learning/retention & Transfer of Learning	Pelfrey Part II	A	ATS CMS CRI NBC PIS VER
STRQ521: Perform limited mitigation. **Demonstrate understanding of and methods of reducing WMD impact and consequences, regarding property loss, particularly infrastructure, and public safety, based on type of agent, personnel, and equipment availability. Elements include hardening targets, establishment of a perimeter, containment, immediate action, both defensive and offensive**	New concepts for improving T&E	Measure of learning/retention & Transfer of Learning	Pelfrey Part II	J*	ATS ADM A5 CMS EPI NBC PIS VER

Requirements	TLI Observations/ Recommendation Source	Specific Observation/ Recommendation	Location	Package	Traced -from
STRQ645: Individual department training prio to TTX. training/exercising for each group, separately, prior to a TTX. This would be easier to setup and accomplish. It would get each group up to speed before they work together, and thus should improve the effectiveness of the TTX. The potential benefits would include easier to setup, easier to arrange, easier to conduct, and training/exercising efficiency.	New concepts for improving T&E	Pre-training	BWTTX Orlando	L	ATS ADM COR CRI DMS HPS NBC PIS VER(s) WBA
STRQ661: Refresher training prior to FSE. even experienced responders may need some amount of refresher training prior to an FSE	New concepts for improving T&E	Pre-training	CWFSE Las Vegas	Input characteristics	ATS ADM A5 CMS CRI HPS MLD NBC PIS VER WBA
STRQ666: Collaborative effort training	New concepts for improving T&E	Distributed, collaborative, decision-making environment	CWFSE Las Vegas	Training	ATS ADM CMS CRI EPI HPS MLD NBC PIS VER

Reviewed Products	Abbreviations
Abbottville Tabletop Simulation	ATS
Advanced Disaster Management System	ADM
Angel Five	A5
CMS (Crises Management System)	CMS
Competency Observation Recording & Evaluation (CORE)	COR
CRISIS	CRI
Decision Making Skills for Public Officials During a Hazardous Materials Incident	DMS
Emergency - Fighters for Life	EFL
Emergency Preparedness Incident Command Simulation (EPiCS)	EPI
EMS Simulator	EMS
Human Patient Simulator	HPS
Multi-Layer Decision Simulation - school violence	MLD
NBC CTS 2000	NBC
PISCES (Pollution Incident Simulation, Control, and Evaluation System)	PIS
Rainbow 6	R6
Virtual Emergency Response Training Simulation	VER
WMD Basic Awareness Training Interactive CD	WBA

*An (s) after the abbreviated name denotes suspect tracings (I.e., they may be modified or confirmed subject to further analysis).

**ERG = ODP's Emergency Responder Guidelines

GLOSSARY

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Term	Definition
Alternative values	The different levels of an instructional strategy attribute, relevant to T&E requirements, and media evaluation. For example, the alternative values for the Student Unit attribute are individual, group, and team.
Asynchronous	Collaborations occur over an elapsed period of time and do not require users to be present in the virtual environment at the same time
Attributes	Characteristics of the instructional strategy including qualities and quantities
Audit plans/procedures	A methodical examination and review of plans, processes, and procedures
Behavioral item	See Responder behavioral item
Best practices	Those strategies, activities, or approaches that have been shown to be effective for training or exercising response to WMD. At this time, best practices are not based on qualitative data.
Decision support tool	A software program incorporating structured decision-making processes to ensure that important decisions are made on time and are based on facts, research, and analysis
Delivery mechanisms	Mechanisms and techniques by which training is delivered, including media, products, and simulations.
Discipline	Organizations and personnel actively engaged in preventing, detecting, and responding to a potential WMD incident by professional background such as law enforcement, fire, emergency management, and emergency medical personnel
Distributed collaborative environment	Software that enables multiple users to electronically interact with each other from different geographical locations, either in real-time (synchronously) or at different times (asynchronously). Interactions can vary from real-time video teleconferencing to email to file sharing.
Evaluation	A systematic method for gathering information about the impact and effectiveness of an intervention where results are used to improve the intervention, determine whether the learning objectives have been achieved, and assess its value to the organization.
Exercise scenario	The synopsis of a possible series of events used during an exercise to make it more realistic
Facilitator	The moderator of an exercise or training
Full scale exercise	An exercise employing a city's actual response elements: equipment, personnel, and other resources are mobilized. EOCs and command posts are activated, first responders attend to people simulating the effects of a chemical weapons attack, decontamination and hazardous materials procedures unfold, and often area hospitals are included in the response.

Functional exercise	An exercise that simulates the reality of operations in a functional area by presenting complex and realistic problems in a highly stressful environment, requiring participants to quickly generate rapid and effective responses. Designed to test and evaluate capabilities such as plans, policies, and procedures.
Game	A competitive environment where individuals or teams of individuals play against each other or against a computer in pursuit of a goal following a set of rules. Games generally have winners and losers and good games offer clear objectives about what it takes to win.
Geo-plot	A geographic-situation display, presented in graphical form, containing representations of terrain, roads, waterways, and other geographical features. A birds-eye view of a geographical area is an example.
Heuristics	Exploratory problem-solving techniques that utilize self-educating techniques (as the evaluation of feedback) to improve performance
Immersive simulation	The student or user is given the impression of actually being in the simulation
Immersive training	Training that plunges the student into learning something by doing it either in a real situation or a simulated situation
Input characteristics	Student/participant entry skills and knowledge.
Instructional strategy	The particular set of training methods used to achieve the desired training outcome and achieve the training objectives. Same as training strategy.
Instructional strategy class	A macro-level strategy for achieving training/exercising objectives; How to train/exercise.
Knowledge management	The process of capturing, organizing, and storing information and experiences of workers and groups within an organization and making it available to others.
Mapping	Linking of a product to a training and exercise category via common training/exercise strategies.
Macro-;evel	High-level description or content, as opposed to a more-detailed specification description.
Media	A generic term for devices used to train and exercise including simulations, computer-based training courses, games, books, tutorials, video teleconferencing, web-based instruction, and MS&G.
Media characteristics	The features of training and exercising media, such as simulation characteristics, media format and context, visual information presentation characteristics, instructor/facilitator aids/tools, audio characteristics, data recording, feedback formats, freeze and fast-forward, instructional branching, advantages & limitations, and other features. Characteristics may also pertain to features such as cost, support staff, etc.
Model	A representation of a real-world effect (e.g., a plume model may show the direction and dispersion of a chemical plume taking into account wind direction and speed); a logical description of how a system performs

Needs	Something that is needed for a system to function as desired. A training need, for example, would be training system elements, such as curricula or media, that are needed to bridge the gap between the current level of individual/team performance and goal-level of performance
On-demand training	Training that is available at any time
Part-task training	Training each part of a complex set of tasks separately rather than training the integrated set of tasks simultaneously
Pre-training	Training or learning that occurs prior to a training course, and allows the student to prepare for subsequent training
Primary training audience	That part of the training or exercise audience at whom the exercise objectives are focused. They receive the majority of the benefit of training or exercise
Rating criteria	Standard against which judgments on the applicability, presence, and/or absence of an attribute were made to ensure standard evaluation ratings of products
Reinforcement training	Training that follows another training or exercise and serves to reinforce the acquired learning
Requirements	Training and exercise system characteristics necessary to meet ODP's preparedness needs in the area of WMD
Requirements analysis process	Detailed steps of the analysis to be performed under the requirements analysis structure
Requirements analysis structure	Overall approach to determining the requirements
Requirements management	Process of identifying, organizing, documenting, and tracking the changing requirements of a project
Requirement view	Within RRP, a database window displaying selected requirements based on a specific query
Resources	Resources associated with training/exercising, including development and conduct. Resources may include training materials, equipment, staff, facilities, time and other factors
Responder and decision-maker data sources	The data sources, including documents and other sources, from which the responder and decision-maker behavioral items were obtained, and placed into the set of requirement categories.
Responder behavioral items	The collection of learning objectives, performance objectives, skills, knowledge, and other behavior-related statements indicative of responder and decision-maker training and exercising requirements.
Scheduled training	Training that has been scheduled to occur at a particular time and place
Secondary training audience	This part of the training audience participates in a training session or exercise, often to provide realism for the primary training audience. Any benefits the secondary training audience receives are serendipitous
Simulations	The implementation of a model, or set of models, to represent the real-world. Simulations test hypotheses and help gain insights into a

	world. Simulations test hypotheses and help gain insights into a problem or situation. Simulations are often repeatable to estimate likely outcomes
Structured feedback	A formal procedure for giving and receiving feedback
Synchronous	Collaboration that occurs in real time. In virtual environment users interact and collaborate in real time.
Synthetic environments	Computer or virtual environments such as models, simulations, or games
T&E package	Within RRP, a folder organizing requirements and requirement views into related groups
Tabletop exercise	A facilitated discussion of various issues surrounding response to a hypothetical WMD event. Tabletops typically occur in a classroom setting and involve representatives from emergency response organizations in the local community (fire, police, ambulance service, hospitals, etc.), elected or appointed officials, senior staff of various agencies, and state and Federal official.
Training and exercising requirement categories	The set of categories that contain all of the responder behavioral items, which were extracted from multiple data sources. Each category, which contains a number of behavioral items requiring similar instructional strategies, is defined in terms of major instructional strategy attributes.
Traceability	Illustration of the relationships between requirements of the same or different types.
Training materials	Training materials are often considered a type of training media such as books, data sheets, and information handouts. Materials do not include simulations or computer based training
Training method	The methods used to conduct training and exercises. Also referred to as training technique
Training procedures	Procedures associated with implementing training methods
Training strategy	The particular set of training methods used to achieve the desired training outcome and achieve the training objectives. Same as instructional strategy.
Training technique	The methods used to conduct training and exercises. Also referred to as Training Method
Tool	An artifact used to perform a particular function to aid training/exercise or provide training/exercise itself. Used interchangeably with the term product in this report.
Whole-task training	Training a complex set of tasks as a whole rather than training each separately
WMD competency levels	The formal levels of competency traditionally associated with WMD training. They consist of 1) Awareness; 2) Performance (sometimes referred to as Performance-A); 3) Technician (sometimes referred to as Performance-B, or Specialty); and 4) Planning and Command (sometimes these are separated).

ABBREVIATIONS AND ACRONYMS

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A5	Angel Five
AAR	After Action Review
ADM, ADMS	Advanced Disaster Management System
ATS	Abbottville Tabletop Simulation
CBT	Computer Based Training
CMS	Crises Management System
COR, CORE	Competency Observation Recording & Evaluation
COTS	Commercial-off-the-shelf
CRI	CRISIS
DMS	Decision Making Skills for Public Officials During a Hazardous Materials Incident
DP	Domestic Preparedness
EFL	Emergency: Fighters for Life
EMA	Emergency Management Agency
EMS	Emergency Medical Services
EMS	EMS Simulator
EOC	Emergency Operations Center
EPI, EPiCS	Emergency Preparedness Incident Command Simulation
F2F	Face-to-face
FE	Functional Exercise
FD	Fire Department
FEMA	Federal Emergency Management Agency
FSE	Full Scale Exercise
GA	Government Administrator
GOTS	Government-off-the-shelf

HazMat	Hazardous Materials
HC	Health Care
HPS	Human Patient Simulator
HSEEP	Homeland Security Exercise Evaluation Program
IC	Incident Command
ICS	Incident Command System
ISD	Instructional Systems Development
JEEP	Justice Exercise Evaluation Program
LE	Law Enforcement
MLD, MLADS	Multi-Layer Decision Simulation
MS&G	Models, Simulations, and Games; used interchangeably with media in this report.
NAERG	North American Emergency Response Guidebook
NBC	NBC CTS 2000
NOTS	Not-off-the-shelf
ODP	Office for Domestic Preparedness
PH	Public Health
PIS, PISCES	Pollution Incident Simulation, Control, and Evaluation System
PW	Public Works
PPE	Personal Protective Equipment
PSC	Public Safety Communications
R6	Rainbow Six
RRP	Rational RequisitePro
SAT	Systems Approach to Training
T&E	Training and Exercise
TLI	ThoughtLink, Inc.

TOPOFF	Top Officials Exercise
UC	Unified Command
VER, VERTS	Virtual Emergency Response Training Simulation
WBA	WMD Basic Awareness Training Interactive CD
WMD	Weapons of Mass Destruction

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